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Medicine on the March

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IT HAS BEEN a great honor to serve as President of the California Medical Association. I wish to express my heartfelt gratitude for the privilege accorded me. To me, the past year will always be the high point of my medical career.

Because they affect the present and will affect the future, I am going to discuss some of the changes that have taken place in medical science and practice during my generation. According to Webster, a generation is 33 years. So I have been able to personally observe these changes as an active practitioner of internal medicine. In that time there have been great advances in scientific knowledge and in technical skills. There have been great changes in the socio-economic picture, brought on by accelerated evolution.

A generation ago the art of medicine was almost uppermost in medical healing. There were very few specific remedies. Important discoveries had taken place in pathology, bacteriology, biochemistry and radiology, but the almost miraculous advances had not yet begun. The family doctor, frequently bearded or Vandyked, and carrying his little black satchel, was held in high esteem and was close to the hearts of his patients. Specialization was just beginning. Roads were poor and transportation was slow. The shifting of the people to the cities had not really started.

The relationship between patient and doctor was much closer and more intimate. The physician was not only a doctor, he was a wise and trusted counselor—a respected friend. He was a leader among men in his community. He thought of man as a whole, of both his mind and his body, not just as a disease entity.

A large part of medical practice took place in the home, where the doctor closely observed the good or bad circumstances under which people lived. He realized how much poor social conditions, poverty, undernutrition, bad housing, poor sanitation and unemployment contributed to the causation of ill health and disease. Man was looked upon in his entirety, and his reactions to health, disease and environment were closely heeded.

The specific prophylaxis and treatment of infections had just started. People could be actively immunized against smallpox, diphtheria and typhoid fever, but these diseases were very prevalent during the usual seasons. The mortality rate was high. Immune sera against diphtheria, tetanus and meningococcal infections were available and if used early were most helpful and effective. Syphilis, with its devastating tertiary lesions, aortitis, aneurism, paresis and tabes dorsalis, was commonplace. Salvarsan had just been introduced. Tuberculosis, with its many manifestations of advanced pulmonary cavitation, adenitis, osteomyelitis and miliary infection, was just beginning to come under control. Mastoid operations were common, and lobar pneumonia was largely treated by inhalations, mustard plasters, turpentine stupes, good nursing care, hope and prayer. Streptococcal and other types of sepsis were frequent and most often fatal.

Then came the sweeping advance of science along all lines. Nutritionists, medical research workers, chemists, physicists, engineers, industrialists, and clinicians all combined their resources to produce the astounding scientific discoveries of the present age. Science rushed ahead, leaving humanism in its wake.

Scientists have taken man apart and minutely examined his organs, tissues, cells and secretions. To a scientist only exact measurable knowledge is satisfactory. Humanism cannot be measured.

Functional conceptions of disease have gradually replaced the structural. Tests of function for nearly all organs of the body have been devised.

Address of the President: Presented before First General Meeting at the 81st Annual Session of the California Medical Association, Los Angeles, April 27-30, 1952.

To the old routine of blood count, urinalysis and Wassermann test were added hundreds of diagnostic laboratory tests. Radiology, with its variety of contrast media, outlines organs, body cavities and vessels, with remarkable diagnostic accuracy. Radioactive isotopes solve many of our fundamental problems in medical science. Electrical instruments have increased our knowledge of the heart and brain and hardly a body cavity or aperture is beyond the prying eye of the inquisitive diagnostician. Even miniature candid cameras film the human interior in enchanting and glamorous color.

In the 1920s came insulin. At that time the average diabetic child lived only a few years. Now he may live an active life to middle age or past, and the adult diabetic may continue his useful, enjoyable existence to almost the same age as others.

Pernicious anemia, with its crippling cord lesions, is now readily controlled with liver or Vitamin B_{12}, and is no longer a sure killer of man.

Active immunization, public health and preventive medicine have proceeded so rapidly that diphtheria, smallpox and typhoid fever are relatively rare. Along with tetanus, these diseases could be quickly eliminated if all people would accept active immunization. Not long ago, in consultation, I diagnosed a case of typhoid fever. The young doctor thanked me for showing him the first case of typhoid fever he had ever seen.

With the advent of the sulfonamides in the 1930s the chemical attack on bacteria in man really began. Then came penicillin and other antibiotics, and most bacterial infections fell before the barrage of the magic bullets. And surely there will be many more of them. There is hope that even tuberculosis may soon fall before the wonders and miracles of modern medical science.

Studies in nutrition and metabolism have produced the many vitamins—somewhat overused, it is true—with prevention and cure of deficiency diseases. Hormones have been synthesized and used to produce remarkable effects. The discovery of ACTH and cortisone opens up an entirely new field of investigation, which may prove to be as important to medicine as the discovery of bacteria causing infections and disease.

The triumphs of modern surgery have quickly followed improved anesthesia, new technical skills and instruments, antibiotics and anticoagulants, improved knowledge of electrolyte and water balance and the increased use of oxygen, blood and fluids in the preoperative and postoperative treatment of dehydration, shock and hemorrhage. Operations upon the heart, blood vessels and lungs are now safely and successfully carried out.

With all these great advances of scientific medicine, we still have not solved the problem of neoplastic diseases and leukemia, influenza, the common cold, peptic ulcer, functional disease, poliomyelitis and virus infections, hypertension and the ever-increasing degenerative diseases.

The pronounced lowering of maternal and infant mortality has given the young an opportunity to live into adulthood—and has created new problems. Life expectancy is now 68 or 69 years, an increase of 18 years in the past generation. There are now upward of 11,500,000 Americans past 65 years, and in the next generation the number will likely be doubled. This creates the need for more intensive study of the problems of old age, both medical and socio-economic.

The prevention and treatment of degenerative diseases in middle and old age is still far from satisfactory. Further research in these diseases is more necessary than ever. Once again, we must fall back on our priceless heritage of a close doctor-patient relationship.

What with all our increased scientific knowledge, technical skills, and laboratory tests, we are in danger of becoming diagnostic and therapeutic mechanics. This must never happen. The assembly line can be used for many things, but not for medical care. Neither the patient nor the doctor is a robot. Only man can understand and treat a man because only man has a thinking human mind.

THE HUMAN RELATIONS OF PHYSICIAN AND PATIENT

In these days of scientific invention, of jet transportation, of threat of destruction by atomic bombs, of growing inflation, of rising taxes, of propagandists and caterwauling commentators, patients feel the need of the art of medicine and of a closer doctor relationship more than ever.

Recognizing such a need, the Council of the California Medical Association, through its Committee on Medical Economics, conducted a study of the individual doctor-patient relationship. As a rule of good medical practice, doctors do not treat themselves. There is an old medical saying that "a doctor who treats himself has a fool for a doctor and a fool for a patient." With this in mind, Ernest Dichter, Ph.D., New York psychological consultant, who has done research for some of the nation's leading businesses and industries, was engaged. Using Alameda County as a field laboratory, Dr. Dichter studied, by the depth interview method, the reactions of doctors and patients to each other, bringing out many fundamental psychological factors in human relations which may make the doctor-patient relationship good or bad.

This report, "A Psychological Study of the Doctor-Patient Relationship," has been printed. It is a most interesting and enlightening document. It reports facts as seen through the eyes of a practical business psychological consultant. Using the facts, suggestions are given on how to improve the relations between doctor and patient—both very similar human beings in their emotional reactions. The report, which is available at the offices of the CMA, is necessary basic reading for all interested in improving doctor-patient relations.

A projection of the report, "Doctor and Patient," summarizing the Dichter study and its practical public relations application, has been prepared by Rollen Waterson, Executive Secretary of

the Alameda-Contra Costa Medical Association. William Tobitt, formerly Executive Secretary of the Orange County Medical Association, assisted in its organization and writing. It has been mailed to all members of the California Medical Association. It should be read by every member. There has been a great demand for these two publications, from all parts of the country. As part of its public relations program the California Medical Association has met this demand. It has mailed out thousands of copies.

It is not my purpose to go into detail concerning these basic psychological and practical studies. I would like to make only a few remarks on the doctor-patient relationship, based on findings in the Dichter report and on personal observations.

Patients desire and need, more than ever, a doctor who will not only work modern scientific miracles but be an adviser, a listener and a friend. They still look upon him as part minister or priest, and have difficulty in reconciling this with what they at times believe are very high fees. With the rapid increase in specialism, they are somewhat confused as to where to go, and to whom to turn. They would like to have someone with the skill of the specialist and the warm friendly wisdom of the old family doctor. Unfortunately, with the rapid advances of medical science, no one doctor can be all-sufficient. What people really are asking for today are doctors interested in the whole man. There are many of these available today as skilled general practitioners, internists, pediatricians, or any doctor who will take the time and interest to study and examine a person *in toto*, to sum up his problems and tell him what he needs to do. This man is the personal physician and everybody needs one.

It has been estimated that 85 per cent of man's ills and problems can be taken care of by his personal physician. When specialist care is necessary, the personal physician is a medical manager, who guides the patient to the proper specialist. He contacts and makes appointments with the specialist and consults with him, giving invaluable information along socio-economic, marital and medical lines. He follows the progress of the patient, along with the specialist, whenever necessary; and what is especially important, he remains the patient's personal physician when specialist care is ended. This promotes a continuing doctor-patient relationship and also improves doctor-doctor relations.

This may look like too big a job for just one doctor—and it is. In order to give personal service, it is necessary for doctors to have some system of handling calls 24 hours of the day. This may be done by their own personal arrangements, or telephone answering service, or through the 24-hour emergency medical service established by many county medical societies, which should be advertised in the newspapers and in the yellow section of the telephone directory. Patients in dire need of a doctor must be able to get medical care. The California Medical Association, through its well organized public relations department, stands ready to aid and assist financially with development of around-the-clock service wherever it may be called on to help.

PATIENTS WANT TO KNOW ABOUT THEMSELVES

Today's patient is more adult and mature than ever before. Through newspapers, magazines, lectures, radio and television, he is getting a great deal of scientific and medical information. He wants to know and understand his medical problems. He is not content to take in its entirety the doctor's authority. He is well informed and he would like to have explanations that are up to the level of his intelligence. In fact, the patient wants to be a participant in his medical care. When he is sick he wants the doctor to use authority, almost paternalistic authority, but when he is getting better he would like to feel that he had something to do with his recovery. He wants sympathy, guidance and help when in need but wants to handle his problems of life when he is again on his own. The wise physician encourages this attitude.

During my medical career it has been my privilege to care for a goodly number of doctors. I would say that doctors as patients are in the same need of the art of medicine as are other patients; they want the same kindly, friendly interest and sympathetic understanding of their problems; and they demand to know all about what is going on all the time; but they don't yield to their doctor's authority with quite the same grace as most patients. Being a doctor and having been a patient, this is to me quite understandable.

One of the most important factors in good doctor-patient relationship is the supplying of first class medical care at a price within the ability of the patient to pay. Within the last 15 years there has been a tremendous growth of voluntary medical care cost insurance, so that now more than one-half of the population is insured against the economic shock of illness by some type of prepayment insurance. It is true that voluntary health insurance is not yet doing the full job needing to be done, but given time and the cooperation of all concerned, plans will be developed which will cover the major cost of serious and prolonged illness in the present framework. This amazing upswing in voluntary health insurance has been developed entirely by private voluntary means, without even governmental encouragement.

It should be understood that voluntary health insurance cannot and should not seek to protect everyone against the full costs of every illness. The aim of voluntary health insurance is and should be to prevent the cost of ill health from causing financial hardship to individuals and families who might otherwise suffer such hardship. Indeed, an important and desirable feature of voluntary health insurance is its selectivity, its ability to furnish a suitable amount of protection for those needing protection, without forcing unnecessary or unwanted protection upon anyone. Doctors of medicine have always given their services to those unable to pay for medical care, and always will.

In spite of greatly increased medical care costs due to scientific advances, increased usage of medical service, and inflation, these costs have not mounted quite as fast as the cost of living. In fact, doctors' fees today are well behind the rise of living costs. Patients get well faster, live longer, and are returned to work sooner, with a great reduction in the loss of income due to lost working hours.

Each physician should set a reasonable value on his services. Here again, as in giving a clear explanation to a patient about his medical problems, the doctor should initiate and invite a frank discussion regarding his services and fees—before, not after, the service has been rendered. This will effect the best medical service based on an open and friendly understanding between doctor and patient.

Many physicians now have their own standard fee schedule, revised downward for patients of lower incomes and raised for those who demand and believe they must have a more luxurious, but actually no better, medical service. This would seem to be a sound business-like approach, provided fair and not exorbitant fees are charged.

An active mediation committee or public service committee, composed of strong, fairminded men, should be part of each county medical society. This committee, open to physicians, patients and insurance companies alike, should settle misunderstandings and differences. It is a rare problem that cannot be satisfactorily settled. Vigorous, positive action should be taken against physicians who do not carry on an honest and fair practice. There is no room in medicine for the greedy, the unethical, or the unscrupulous.

American medical schools are training the finest of scientific doctors. As has been pointed out, good doctor-patient relationship depends not only on science but on the art of medicine and good business practice. During the past few years much has been done in developing a more scientific approach to psychosomatic medicine. This is a great advance. Should not the same scientific approach be used in teaching the basic psychological factors needed in the art of the practice of medicine? It would seem most important that this be done, and by those qualified by knowledge and experience in medical practice.

Most physicians choose their profession for idealistic reasons. While the expectation of making a good living enters into the picture, the idea of devoting oneself to helping others is a very strong incentive. This is as it should be.

It must be recognized that there is a business side to medicine. Here again, instruction by qualified experts on the business of the practice of medicine would seem of vital importance. I am sure that doctor-patient relationships in general would be the better for it. The study of social economics and the doctor-patient relation should continue throughout a doctor's working years.

A year ago the Council of the California Medical Association made funds available to a committee studying industrial fees for the purpose of employing business research analysts to look into basic costs of medical services in industrial medicine.

There have been great socio-economic changes with the redistribution of wealth. The spectacular growth of health insurance and union welfare plans has emphasized the many difficulties and problems of medical fee schedules. Physicians take care of more patients than they once did. Higher taxes and inflation have further reduced buying power. It would seem wise that the California Medical Association continue and extend the study by business research analysts into all factors which enter into the costs of medical service. Such a study would be of great benefit to physicians in helping set a reasonable value on their services and of even greater assistance to frustrated committees struggling desperately to develop an acceptable fee schedule.

Every good doctor is entitled to a good income. The effort he puts forth is no ordinary effort. In America anyone who puts in the extra time and effort to obtain extraordinary knowledge and skill is deservedly rewarded.

If humanism has lagged behind science, it is only because we are living in a time which has been dominated by unbelievable scientific progress. It is characteristic of progress that it proceeds in zig-zag course. Today science is at the peak. Tomorrow humanism will rise. Looking into the past one finds humanism in medicine centuries older than in the other sciences. Looking into the future, it is not hard to visualize doctors, in their traditional style, advancing with new scientific miracles and an improved doctor-patient relationship, to a better practice of medicine filled with the greatest medicine in life—man's friendship for man.

230 Grand Avenue.

Antibiotic Therapy of Abscess of the Lung and Bronchiectasis

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SUMMARY

Since the fusospirochetal group of bacteria are the commonest etiologic agents in abscess of the lung, aqueous crystalline penicillin is the agent of first choice in the majority of cases. Streptomycin is indicated for a small group of cases in which Klebsiella is the etiologic agent. Aureomycin, chloramphenicol or terramycin may produce an excellent therapeutic response either initially or after therapeutic failure with penicillin.

Administration of antibiotics by inhalation should be carried out in conjunction with systemic forms of treatment.

In the treatment of bronchiectasis, the antibiotics are most useful in the control of acute exacerbations of pulmonary infection which punctuate the course of this disease.

THE advent of antibiotic agents has altered completely the management of acute and chronic bronchopulmonary suppuration. The bacteriostatic and bactericidal specificity of these agents has made clear the necessity for more, rather than less, specific bacteriologic diagnosis if proper treatment is to be applied. Alteration of bacterial interrelationships by eradication of sensitive bacteria permitting preponderance of resistant organisms and adaptation of bacteria followed by resistance to antibacterial agents are important phenomena in the practical management of patients. Dosage must be adequate and duration of treatment sufficient to bring infection well under control rather than merely to confuse the clinical picture and make future therapy and prognosis difficult. The purpose of this paper is to discuss the features related to antibiotic agents in the treatment of lung abscess and bronchiectasis.

Bacteriologic Diagnosis

A necessary preliminary to proper antibiotic therapy of pulmonary suppuration is an attempt to identify the causative organism. Identification is not always possible, but often failure results from reliance upon routine aerobic cultures of the sputum, whereas bacteriologic studies in such cases should include: (1) Repeated direct examination of concentrated sputum specimens for the purpose of determining whether or not the tubercle bacillus is an etiologic agent; (2) culture of the sputum upon Sabouraud's medium for detection of yeast and fungi and direct examination of the sputum for the sulfur granules of actinomycosis and mycelia of other fungi; (3) direct sputum smears stained with gentian violet for detection of fusiform bacilli and spirochetes; (4) aerobic cultures for the detection of pyogenic organisms.

The bacteria most commonly associated with lung abscess are fusiform bacilli and spirochetes. Smith,[4] reporting upon a study of a series of 135 cases of abscess of the lung, noted that organisms of the fusospirochetal group were the infecting agents in 74 per cent of cases and other pyogenic bacteria in 26 per cent. The latter group includes Staphylococcus aureus, Gram-negative rods, such as Klebsiella pneumoniae (Friedlander's bacillus), Escherichia coli, Proteus and Pseudomonas aeruginosa (pyocyaneus) and the Clostridia group of anaerobes. A mixture of bacteria may be present in the sputum, and decision with regard to the important agents with respect to pathogenesis may be difficult without repeated cultural studies. Cultural studies are particularly important, however, for occasionally the organism causing the abscess is one that is resistant to penicillin—Klebsiella pneumoniae or other Gram-negative bacilli. If these bacteria go undetected much valuable time will be lost, and an acute abscess curable by chemotherapy alone if begun promptly may progress to a chronic phase necessitating surgical intervention.

New Infections During Antibiotic Therapy

The occurrence of new infections arising during the course of treatment with chemotherapeutic agents has been well documented.[6] The effect of highly potent but specific antibacterial agents upon mixed bacterial flora, such as are present in the throat, bronchial tree, intestine or wounds is well known. Penicillin therapy is frequently followed by predominance of Escherichia coli, Klebsiella, Proteus or Pseudomonas in the throat or sputum; and after treatment with streptomycin cultures of material from the throat may grow Staphylococcus aureus almost exclusively. Aureomycin and chloramphenicol therapy often leaves a predominance of Proteus or Pseudomonas in the sputum because of their resistance to those antibiotic drugs. Multiplication of these resistant bacteria occurs frequently, and since they are often virulent and invasive, new infections

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may occasionally follow. The mechanism by which this occurs is not entirely clear. It cannot be ascribed entirely to ecologic change in bacterial flora or merely to pronounced increase in the number of highly virulent bacteria, since these phenomena are observed frequently whereas new infection is uncommon. As new infection is relatively rare, use of combined antibacterial therapy is not justifiable. However, the possibility should be borne in mind when improvement does not occur or is only temporary, for proper treatment in such circumstances is readily effective. Well chosen bacteriologic studies will usually demonstrate such an occurrence with little difficulty.

Penicillin-resistant Staphylococci

One of the broad problems related to the widespread use of antibiotics which is of particular importance in the treatment of chronic bronchopulmonary suppurative disease is concerned with the increased incidence and significance of staphylococcal infections and particularly the increase in penicillin-resistant staphylococci. It was early recognized and later confirmed that the development of penicillin resistance in vivo during treatment occurred infrequently. It was noted, however, that Staphylococcus aureus associated with bacterial endocarditis, osteomyelitis or wound infections did develop resistance, and in the last few years there has been an increased incidence of penicillin-resistant staphylococci and infections due to these bacteria. Barber and Rozwadowska-Dowzenko presented data concerning the increasing incidence of penicillin-resistant staphylococci.[1] They reported that during the period of April-November 1946, 14.1 per cent of the cultures of Staphylococcus aureus were penicillin-resistant, whereas during February-June 1948, 59 per cent of cultures of these bacteria were penicillin-resistant. The importance of penicillin therapy in this phenomenon is emphasized by the observation that the incidence of penicillin-resistant staphylococci cultured from patients in the out-patient department or at the time of admission to the hospital occurred with approximately the same frequency as previously, whereas increased incidence of these resistant staphylococci was noted in cultures of material taken from the noses of attendants, nurses and physicians in the hospital who probably had acquired such bacteria from penicillin-treated patients, and who probably in turn transmitted the hardier organisms to other patients.

The conclusion may be justified that staphylococcal infections in patients who have neither received penicillin nor been hospitalized for appreciable periods can still be expected to respond as usual to penicillin in average dosage. Among the other groups a pronounced increase in therapeutic failures can be expected. Awareness of this phenomenon is of importance in order that the drug sensitivity of these bacteria may be determined and a higher dosage of penicillin or other antibacterial agents may be used if therapeutic response is inadequate. Fortunately most varieties of Staphylococcus aureus are sensitive to low concentrations of aureomycin. Preliminary results in the treatment of penicillin-resistant staphylococcal sepsis with aureomycin are encouraging.

These considerations are of particular importance in chronic pulmonary disease because of the increased incidence of coagulase-positive Staphylococcus aureus in cultures of sputum. Finland[3] pointed out that in the majority of patients no striking disease picture appears to result from the staphylococci present, but that in occasional patients large numbers of staphylococci are associated with grossly purulent sputum either with or without acute constitutional symptoms or x-ray evidence of an infiltrative pulmonary process. These observations may be of importance in essentially two situations. First, if the patient does not respond to penicillin in average dosage, particularly if procaine penicillin preparations are employed, penicillin-resistant staphylococci may be involved. If these organisms are present in appreciable numbers or as the predominant organism of the sputum, aureomycin therapy should be instituted promptly and, depending on the gravity of the situation, sensitivity tests performed. Second, if staphylococci are observed to be present in a patient with pulmonary suppuration, particularly if penicillin has previously been administered or the patient has been in a hospital environment for a prolonged period, aureomycin rather than penicillin may well be the agent of first choice.

The Nature of Suppurative Lesions in Relation to Chemotherapy

The importance of determining the bacterial agent and then promptly starting the best antibacterial therapy particularly in acute pulmonary suppuration is emphasized by the nature of the pathologic lesion in these processes. The effectiveness of chemotherapy in all infections, in the lung as well as elsewhere, is greatly affected by the speed and degree to which significant tissue necrosis occurs. The acute pneumonia produced by the pneumococcus is usually characterized by persistent viability of the essential anatomical framework of the lung which is necessary for resolution and repair. The bacteria previously mentioned as commonly responsible for pulmonary abscess and later bronchiectasis also produce an acute pulmonary process which in the early phases does not greatly alter the usual pulmonary architecture, but which later causes rapidly progressive anatomical destruction with loss of blood supply and tissue necrosis. This loss of structure makes the problem of control of infection and healing difficult. Diffusion of chemotherapeutic agents into areas of necrosis with poor blood supply may be considerably impaired and the chemical constituents of the exudate may interfere with the action of these agents. Destruction of normal architecture introduces mechanical problems in healing which may be insurmountable and result in cavities or areas of bronchiectasis which may then be foci for further extension of disease. Since almost all of the bacteria in question are relatively sensitive to one or more of the antibiotic agents it is of the greatest importance to determine promptly the pathogenic agent and apply specific anti-infective therapy at once.

TREATMENT OF ABSCESS OF THE LUNG

The liberal use of antibacterial agents has prevented the development of pulmonary abscess in many instances, and in others has made the disease less severe. When properly applied, antibiotic therapy has been so satisfactory in controlling at least the acute constitutional signs of sepsis that the necessity for surgical drainage of an acute abscess of the lung has almost disappeared. The size of an abscess, as observed in x-ray films, should not influence the nature of treatment. A large abscess cavity with a wide expanse of fluid does not necessarily indicate a large area of tissue necrosis; these features may be caused by obstructive emphysema. Rapid disappearance of such a cavity may occur after relief of bronchial obstruction by bronchoscopic aspiration, or after subsidence of edema with establishment of bronchial drainage following adequate chemotherapy.

Once the diagnosis of abscess has been established, and the sputum has been examined to ascertain the bacterial flora, anti-infective treatment should be started at once. When the infection is due to predominantly Gram-positive organisms or to bacteria of the fusospirochetal group, penicillin should be used. When the infection is a mixed one, in which significant numbers of Gram-negative bacilli are also present, or when the latter are the predominant organisms, combined intramuscular treatment with penicillin and streptomycin should be employed, or one of the newer antibiotics (aureomycin, chloramphenicol, terramycin) may be given. Systemic administration should be supplemented by aerosol inhalations. Because abscess of the lung most often is caused by fusospirochetal organisms or Gram-positive cocci, penicillin is a satisfactory antibacterial agent in the vast majority of cases. Treatment should be intensive. Aqueous crystalline sodium or potassium penicillin preparations should be used intramuscularly in doses of 200,000 to 400,000 units every four hours — 1,200,000 to 2,400,000 units daily. As abscess of the lung is an acute emergency, reliance should not be placed upon procaine penicillin preparations until a satisfactory clinical and roentgenographic response has been obtained with the more certain aqueous penicillin preparations.

Some observers have advocated combined use of sulfadiazine and penicillin in spite of the ineffectiveness of sulfadiazine alone in the treatment of fusospirochetal pulmonary abscess before penicillin was available. Insufficient data are available to justify a categorical statement regarding the combination. It is the author's opinion that sulfadiazine is of little importance except in two situations: First when, after a period of penicillin therapy, invasion of diseased tissue by Gram-negative bacilli occurs; and, second, when the initial infective agent is one of the Klebsiella (Friedlander's bacillus) group. The value of sulfonamides even in these instances can be greatly discounted now that aureomycin, chloramphenicol and terramycin are available.

A number of investigators have reported varying results with use of neoarsphenamine in the treatment of acute pulmonary abscess. The wide variation in the results of treatment with arsenicals may be partially due to differences in the kinds of cases treated. With the advent of satisfactory antibiotic agents that entail little if any risk of toxicity, the applicability of neoarsphenamine to the treatment of acute lung abscess has been eliminated.

Streptomycin is indicated for treatment of abscesses of the lung, few in number, caused by Gram-negative bacilli. Klebsiella pneumoniae is the most common and important member of this group. Proteus, Pseudomonas or Escherichia coli may also be the predominant organism less commonly. These bacteria, particularly Klebsiella, may be the primary etiologic agent, or they may become predominant after a prolonged period of penicillin administration. Demonstration of these bacteria in significant numbers before antibiotic therapy is, therefore, important since otherwise they may represent merely secondary invaders of doubtful or low grade pathogenic significance.

If a change in the bacterial flora of the sputum occurs during chemotherapy, with the consequent appearance of bacterial pathogens not susceptible to the anti-infective agent being used, there may be either a lag in clinical response to therapy or an acute exacerbation of constitutional signs of sepsis, with or without extension of pulmonary disease. Should these events occur in the course of penicillin therapy, cultural studies of the sputum should be initiated and streptomycin should be added to the chemotherapeutic program. Penicillin may or may not be discontinued at this point, depending upon the previous duration of therapy and progress of the disease. Streptomycin should be administered intramuscularly in a dosage of 0.5 gm. every six hours. Whereas combining sulfonamides with penicillin has seemed to add little to the therapeutic effect in instances such as these, when streptomycin is indicated, combining sulfadiazine with it appears rational. Experimental evidence indicates the advantage of combined streptomycin and sulfadiazine in the therapy of infections with Klebsiella. Clinical experience suggests a beneficial effect from sulfadiazine in the treatment particularly of chronic pulmonary suppuration associated with bronchiectasis, emphysema, etc., in which Gram-negative bacilli may be present. One of the newer antibiotic agents may also be used in these circumstances. Chloramphenicol is possibly the best in this particular situation because of its somewhat greater activity against Proteus and Pseudomonas. It should be given for an initial period in a daily dose of 3.0 gm. Aureomycin or terramycin may also be effective if Klebsiella or Escherichia coli are the predominant bacteria.

The value of aureomycin, chloramphenicol, and terramycin is not known precisely because of lack of sufficiently broad experience in their use in this disease. Scattered reports of the successful use of aureomycin in the treatment of abscess of the lung have appeared but it is impossible to make any comparative evaluation with penicillin. Careful observation

of treatment with terramycin has been reported in only a few cases. Several points are clear, however. First, aureomycin and terramycin are inhibitory in vitro against fusiform bacilli, anaerobic rods of the Bacteroides group and Spirochetes, which are of importance in the production of the anaerobic type of pulmonary suppuration. They likewise inhibit the pyogenic cocci, the pneumococcus, beta hemolytic streptococcus and staphylococcus, which cause lung abscess less frequently, as well as many strains of Klebsiella pneumoniae. On the basis of in vitro studies, therefore, these agents might be expected to be effective clinically. It should be emphasized, however, that the broad antibacterial spectrum of these antibiotics and, therefore, their apparent wide applicability to infections such as these, does not in any way negate the importance of determining the pathogenic agent. This is especially true because of the considerable variation in degree of susceptibility of Gram-negative bacilli to these agents. Second, these drugs have been proved to be clinically effective in a small number of cases of two kinds. The larger of the two groups was made up of cases in which penicillin and sulfonamides were ineffective and striking response occurred when aureomycin or terramycin was given. This occurred in some instances despite the fact that the predominant bacteria in the sputum were penicillin-sensitive. In a much smaller group there was satisfactory response when these agents were given initially, without previous chemotherapy. Third, following the use of these drugs, Proteus and Pseudomonas may become predominant, due to their resistance, and in some instances may be responsible for invasive infection. In such circumstances streptomycin and sulfadiazine combined must be used. In a few instances when the risk of acute infection is great or when sepsis is uncontrollable, the administration of potentially toxic agents such as neomycin or polymyxin may be followed by a satisfactory response. Even if this is only temporary it may permit appropriate surgical intervention.

Although the greatest value of aerosol treatment is in connection with chronic pulmonary suppuration (as discussed later) it should also be employed in the therapy of acute lung abscess. Cases have been reported in which response to intramuscular administration alone was unsatisfactory and the patient did not do well until penicillin or streptomycin aerosol was added. Bronchoscopic examination should always be performed as a diagnostic procedure, and local intrabronchial instillation of 100,000 units of penicillin (or streptomycin if the flora is Gram-negative) in 5 cc. of physiological saline solution should be carried out at the same time. The endotracheal method of treatment takes advantage of the gravitational flow of solutions into rigid suppurative foci which might not be penetrated by aerosol. Subsequent local therapy may be accomplished by aerosol administration of 100,000 units of penicillin dissolved in 1 cc. of physiological saline solution or 100,000 units of microcrystalline penicillin dust three to five times a day.

In the presence of suppurative necrotic foci, it is foregone that conservative treatment, even when it is effective, must be continued over a long period—several weeks, perhaps months—in order to prevent relapse. However, unless there is definite and continuing improvement in the first two to four weeks of adequate conservative therapy, surgical intervention should be considered, for delay in such circumstances might permit greater pulmonary damage and necessitate more radical operation.

The best time to begin conservative treatment is during the first four weeks of the disease. It should include administration of anti-infective agents, measures directed toward bronchial drainage, and general supportive therapy. If the patient makes satisfactory progress, treatment should be continued until constitutional symptoms of sepsis and local symptoms of bronchopulmonary suppuration have abated and there are no roentgenographic abnormalities in the segment of lung involved.

The criteria of cure of abscess of the lung suggested by Touroff[5] apply equally well whether medical or surgical treatment is employed: The patient should be symptom-free and there should be no abnormality in a roentgenogram of the chest or a bronchogram.

If medical treatment is unsuccessful and the abscess becomes chronic, only rarely can chemotherapy effect cure. An abscess of three months' duration is usually characterized by a thick-walled cavity, bronchiectasis and chronic organizing pneumonitis. As restoration of anatomical relations approaching normality then is foreclosed, chemotherapy should be used only to prepare the patient for operation with respect to control of surrounding acute pneumonitis, control of constitutional signs of acute sepsis, reduction of the quantity of sputum, and prevention of systemic dissemination of infection during the preoperative period.

TREATMENT OF BRONCHIECTASIS

Bronchiectasis, an irreversible pathological process involving the bronchial tree and surrounding pulmonary parenchyma, has assumed increasing importance in recent years. With better methods of diagnosis it has been observed to be considerably more common than was previously supposed, and chemotherapy combined with improved thoracic surgical technique has completely changed the method of management of the disease. That the definitive treatment of bronchiectasis is surgical cannot be questioned, but only about half the persons with this disease are suitable candidates for operation. Many have extensive bilateral disease, which precludes surgical eradication. Medical measures may provide effective symptomatic relief for a large number of patients ineligible for operation. The proper use of penicillin and other methods of treatment for pneumonia and infections of the sinuses is important in preventing the development and progression of the changes comprising bronchiectasis and in minimizing hilar fibrosis which increases the difficulty of dissection at the time of operation.

Although penicillin is important in the management of bronchiectasis, the effect is temporary. It is most useful in the control of acute respiratory infections associated with varying degree of pneumonitis which are frequent in patients with bronchiectasis, and for the preparation of patients for operation. The use of antibiotics should probably be reserved primarily for these situations. In the absence of acute constitutional signs of infection, providing adequate drainage should be the initial step in control of cough and sputum. Postural drainage is important, as are control of bronchospasm, if present, with aerosols of epinephrine (1 to 200 or 1 to 300) or Isuprel® (0.15 cc. of 0.05 per cent plus 0.5 cc. of saline solution), and facilitation of penetration of agents and liquefaction of sputum with wetting agents (Ceepryn,® nonionic type, three drops added to epinephrine) are all important. If the airway is cleared and adequate drainage is obtained, much infection will resolve or improve independently of chemotherapy. Antibiotics may then be reserved for acute exacerbations of infection or for use in cases in which such a program of conservative management is not effective.

Culture of the sputum should be carried out before antibiotic therapy is started. Although aerobic cultures are of greater importance in planning the chemotherapy of bronchiectasis than they are in the case of abscess of the lung, the other measures previously outlined for the detection of tubercle bacilli, organisms of the fusospirochetal group and the presence of yeast and fungi should be included in the bacteriologic studies. Since the bacterial flora is usually predominantly Gram-positive, penicillin, if it has not been employed previously, is usually the agent of choice. Procaine penicillin preparations may be employed in single daily doses of 600,000 units. Parenteral therapy should be continued until the acute constitutional signs of active infection are controlled. Occasionally Gram-negative rods may predominate. This is particularly significant if they are of the Klebsiella or Hemophilus groups although Proteus and Pseudomonas may occasionally appear to be of pathogenic importance. Streptomycin, or one of the newer antibiotics, is then the agent of choice, in daily doses of 1 to 2 gm. divided into two or four doses of 0.5 gm. each.

The importance of administration of antibiotic aerosols is well established. Although good results may follow parenteral therapy alone, in many cases substantial improvement does not take place until aerosol administration also is employed, and in others considerable additional reduction in sputum occurs after aerosol is used. After intramuscular injection, penicillin appears in the sputum of patients with bronchiectasis in only low concentration if at all, whereas high concentrations can be obtained by local use. The best results are obtained by intramuscular injection concomitantly with aerosol administration, particularly if acute pneumonitis accompanied by fever and large amounts of sputum is present. For aerosol therapy, 100,000 units should be administered four or five times daily. When the acute signs of sepsis subside, parenteral administration may be discontinued and aerosol therapy gradually diminished. If Gram-negative bacilli are present, particularly Klebsiella or Hemophilus, streptomycin should be employed both parenterally and by aerosol, with 100 mg. given by inhalation four to five times a day. Streptomycin-resistant Gram-negative bacilli frequently appear after three to seven days of this therapy.

Various methods have been described for aerosol therapy.[2] In one method a hand-operated bulb or foot pump supplies the power necessary to break up the aqueous solution into a mist, and in another compressed oxygen is used for the purpose. Although the hand bulb is readily available and simple, it does not produce a fine enough mist and its use is tiring to the patient. A third method of aerosol therapy employs micronized particulate penicillin dusts.

The particle size of atomized liquids or dusts is of extreme importance if these agents are to reach the recesses of the lungs. It has been shown that particles above 30 microns in diameter are mainly trapped in the trachea. Most atomizers produce particles of this size, and although they might be effective in the treatment of lesions of the trachea or larger bronchi, they would not reach lesions of the smaller bronchi or bronchioles. Particles 10 to 30 microns in diameter penetrate to the terminal bronchioles, and those ranging from 3 to 10 microns reach the alveolar ducts. Particles less than 3 microns in diameter reach the alveolar sacs but not all are retained in these areas. Particles smaller than 0.5 microns in diameter reach the alveolar sacs, but only about half of them are deposited in the lungs; the rest are contained in the expired air. Obviously it is important that an adequate proportion (by weight) of particles of liquid aerosol or dust reach the terminal bronchioles and alveolar ducts. The Vaponefrin® nebulizer, which is made of either glass or unbreakable plastic, produces a finely divided aqueous mist when powered with an oxygen flow of about 5 to 8 liters per minute. The particles are of such size that adequate amounts reach the bronchioles, yet many are large enough that they are not discharged with the expired air and a re-breathing bag is unnecessary. It is important that the atmosphere breathed in the initial phase of inspiration contain the mist. Otherwise much of it will be present in the dead space of the lung, and particles below 30 microns in diameter will be breathed out with the expired air. Equipment for carrying out aerosol therapy of this kind in the home is available. Penicillin may be obtained in small, readily dissolvable tablets that can be dropped through the vent in the nebulizer. A small volume of saline may then be added.

Penicillin powder pulverized to particles of suitable size is also satisfactory for reaching the recesses of the lungs by the inhalation route, although it is thought by some investigators to be less effective and more wasteful of drug than liquid aerosol.[2]

How long to continue treatment depends upon the effects obtained. Control of the acute episodes of pneumonitis is generally relatively rapid, but more

prolonged treatment is necessary to bring about subsidence of the chronic inflammatory process. While in some cases pronounced improvement may appear after the first week of therapy, some patients may not improve until after two to four weeks of treatment. The irreversible changes in the bronchial tree predispose to early and frequent reinfection. Often patients who have striking improvement during penicillin aerosol therapy have recurrence of cough and expectoration soon after treatment is stopped. Prolonged treatment with penicillin aerosol, or a succession of courses of four to six weeks each, appear to be indicated in many such cases. Improvement may be expected in 50 per cent to 75 per cent of patients, and by repeated treatment considerable rehabilitation may be achieved. Poorer results may be expected in elderly patients with emphysema and fibrosis, as transmission of the aerosol to the site of infection is impeded.

Oral reactions to penicillin aerosol—edema of the lips, stomatitis or glossitis, with the tongue either red or grayish-black—occur in some patients, sometimes after a few days of treatment, sometimes not until considerably later. The mechanism of such reactions is not known, but it is believed to be entirely a local effect. Rinsing the mouth and throat thoroughly and carefully with water or saline solution after each administration of penicillin aerosol decreases appreciably the incidence of this side effect.

The position of aureomycin, chloramphenicol and terramycin in the management of chronic bronchopulmonary suppuration is at best difficult to evaluate. The effectiveness of these drugs is most clear-cut in the treatment of acute exacerbations of chronic disease. In these circumstances a large proportion of patients will have significant or pronounced improvement, with decrease in fever, lessened amounts of sputum, change in character of the sputum from foul or purulent to mucoid, and usually gradual resolution of the pulmonary process as observed in roentgenograms. As in the case of all antiinfective agents, the results with these agents will depend upon the sensitivity of the bacteria involved, the degree to which bronchial drainage is occurring, and the nature and extent of the basic pulmonary lesion. What was said about these agents in the treatment of abscess of the lungs applies also to bronchiectasis. First, a large number of the bacteria that cause chronic pulmonary suppuration are susceptible to these newer antibiotics. Favorable response frequently is obtained when they are used. This is true particularly when the Staphylococcus or Gram-negative bacilli are predominant in the sputum, and when varying degrees of acute pneumonitis are present. Favorable response may be observed after failure has occurred with penicillin or streptomycin. Second, the rapid development of streptomycin resistance and the slow appearance of aureomycin resistance may be an important factor when therapy must be relatively prolonged. Third, susceptible bacteria are frequently eradicated rapidly from the sputum with clinical improvement, but resistant organisms, particularly in the Proteus, Pseudomonas and Klebsiella-Aerobacter group, frequently reappear thereafter. These bacteria may cause a continuing low-grade suppurative process, or actual acute exacerbations of disease.

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The Management of Abscess of the Lung

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SUMMARY

A review of the literature raises considerable doubt as to the advisability of surgical drainage of lung abscess as a definitive procedure. The mortality rate with use of this procedure and other hazards associated with it, must now be viewed in the light of improved methods of conservative therapy — involving the use of penicillin, bronchoscopic treatment and postural drainage—by which cure can be obtained in more than 80 per cent of cases of acute abscess and in a smaller proportion of cases of chronic abscess. Another factor to be considered is the better chance for diagnosis and effective resection of associated carcinoma when conservative treatment is employed.

THE treatment of abscess of the lung, either "acute and chronic," or "simple and complicated"—the terms are those preferred by Moore,[3] Overholt and Rumel,[17] and Neerken and Grow[4]—has now passed through two major phases, the era of conservatism and the era of external drainage. In the pre-antibiotic era, a shockingly high mortality rate—at least 30 per cent—was associated with conservative management, and many patients were left with chronic pulmonary disease. The doctrine of early external drainage was most strongly advocated by Neuhof and Touroff;[5, 6] and, applying it, they achieved a sharp decrease in mortality rate. In 1942 they reported upon the use of early drainage in 152 cases, with a mortality rate of 2.6 per cent. These results were not equalled by other investigators, however. Even Shaw,[8] an equally enthusiatic advocate of one-stage drainage, reported a mortality rate of 15.2 per cent. Smith,[10] in a review of collected reports of 744 cases in which surgical treatment was used, noted that the mortality rate was 32.7 per cent—only slightly better than the death rate of 34.7 per cent in 906 cases in which conservative therapy was employed. Bosher[1] recently reviewed the surgical treatment of abscess of the lung at Barnes Hospital through the years 1943-1948. The overall surgical mortality from drainage was 30 per cent.

In light of these unimpressive reported results and with effective antibiotic therapy and increased facility in pulmonary resection now available, the efficacy of external drainage as a definitive method of treatment must be seriously questioned. Certainly the disadvantages of surgical drainage, since they need no longer be accepted as unavoidable collateral results of the treatment, ought to be scrutinized. In the main, these disadvantages are:

1. Ineffectiveness in multiple, or complicated abscesses.

2. Hemorrhage. Although lung abscesses are almost always at the periphery they may be on fissure surfaces in close proximity to major vessels. Even those which are peripheral in relation to the chest wall may contain large vessels within trabeculae, since the vessels are the last structures to be destroyed.

3. Persistent bronchopleural cutaneous fistulae. If prompt healing does not occur, epithelization may proceed from both the bronchial and the cutaneous pole. Plastic procedures to close the fistulae are, in the main, ineffective and resection must be resorted to.

4. Residual bronchiectasis. Even with satisfactory healing of the abscess there may be sufficient change in the pulmonary architecture to result in symptomatic bronchiectasis of the area. This is one of the chief factors in the low rate of cure and in the development of postoperative morbidity.

5. Drainage, by inadvertence, of specific infections. For example:

CASE 1.—A 30-year-old man was admitted to the hospital with a history of mandibular osteomyelitis of about a year's duration. Both external and internal drainage of the jaw were present. Chest pain, cough and discharge of purulent sputum developed about six weeks before admittance. In x-ray films an abscess cavity in the apex of the left lower lobe was noted. Multiple concentrated smears of the sputum were negative for acid-fast bacilli. Conservative therapy was carried out without appreciable change in the appearance of the abscess. Five weeks after the patient was admitted, cultures of gastric material were reported as positive for tubercle bacilli. Early drainage would have been undesirable.

CASE 2.—A man 28 years of age was admitted with a history of recent moderately severe hemoptysis, cough, and purulent sputum. An abscess cavity in the apex of the right lower lobe was noted in x-ray films. The flora of the sputum were not diagnostic, but there was a 4 plus reaction to a coccidioidin skin test. At lobectomy the lesion was observed to be a coccidioidomycotic cavity with secondary infection. Again, external drainage would have been undesirable.

6. Empyema. Adhesions present between the lungs and the wall of the chest may rupture afer operation for drainage (even though apparently they were of adequate extent at the time drainage was carried out) thus contaminating the pleural space, often with considerable pulmonary collapse due to the large bronchopleural fistula.

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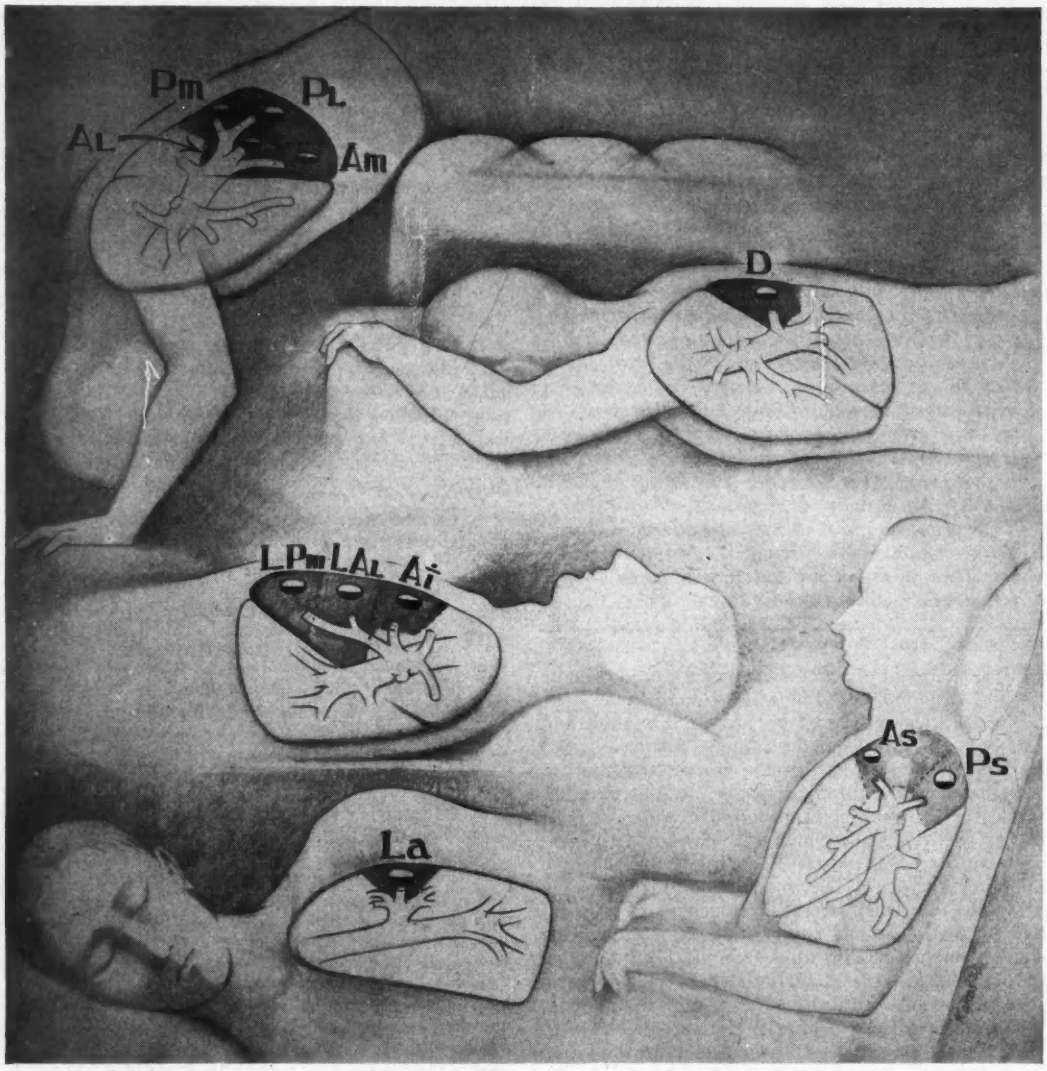

Figure 1.—Various positions for postural drainage; the location of the lesion dictates the position.

7. The drainage of unsuspected carcinoma. The greatest danger of surgical drainage is in opening into a carcinoma or overlooking its presence. If there is central necrosis of the tumor, recognition of the lesion is easy, but dissemination along the track may have occurred. If the tumor is small and the abscess is distal, the lesion may go unsuspected for weeks, or even months, and may be inoperable when it becomes obvious.

VIGOROUS CONSERVATIVE TREATMENT

The present regimen, designed to avoid these complications, consists of vigorous conservative treatment, comprising: (1) Penicillin in high dosage, perhaps with other antibiotic or sulfonamide therapy. (2) Bronchoscopically directed application of antibiotics and treatment of the swollen draining bronchus as often as necessary, usually twice a week. This procedure also helps to determine the site of the lesion and to rule out carcinoma or the presence of a foreign body. (3) Postural drainage, which, to be effective, requires a knowledge of the bronchopulmonary segments and accurate localization of the lesion. The posture must be tailored to the individual case (Figure 1). For example: Abscesses in the apical lower lobe segments are best drained by putting the patient in the prone position; for lesions of the upper lobe superior segments, the upright position is best.

The regimen outlined can be expected to accomplish:

1. Healing in 80 per cent or more of cases of acute or simple abscess.

CASE 3.—After herniorrhaphy a patient had symptoms of lung abscess, and in x-ray films an abscess cavity in the apex of the right lower lobe was noted. Penicillin, 100,000 units every three hours, was given. In bronchoscopic examination, edema and stenosis of the right dorsal bronchus was observed. This was treated twice weekly with epinephrine and direct application of penicillin by bronchoscope. For drainage, the patient was put in the prone and then in the supine position for alternate hours during the day. Prompt healing occurred. In an x-ray film a month after the onset of symptoms, only residual enlargement of the hilar nodes was noted, and in a film taken four months later there was no evidence of residual disease.

2. Healing in a smaller percentage of cases of chronic abscess.

CASE 4.—A man 61 years of age entered the hospital with a history of the onset of hemoptysis, fever and copious foul sputum six months previously. The body weight had decreased 40 pounds, and lassitude and pronounced anorexia were noted. An abscess in the apex of the left lower lobe, with a wide surrounding area of pneumonitis, was noted in x-ray films. There was suspicion of neoplasm also, but in bronchoscopic examination only edema and pin-point stenosis of the left dorsal bronchus were observed. As the patient was too ill for resection, the regimen outlined in Case 3 was followed. Improvement was so pronounced and rapid that the presence of a tumor was felt to be unlikely. The bronchoscopic therapeutic procedures were carried out twice weekly for two months, then once a week for another month. In an x-ray film taken 13 weeks after the first treatment, virtually complete clearing was noted. The patient was observed at three-month intervals for the succeeding two years. He remained free of symptoms.

3. Sufficient clinical improvement to permit resection without the complications of previous drainage.

CASE 5.—A 57-year-old patient, an habitual user of alcohol, was admitted to the hospital, chronically ill. Copious amounts of foul sputum were discharged. In x-ray films, extensive pneumonitis, fluid and an abscess were noted in the right upper lobe. The patient had been admitted two years previously, and in an x-ray film taken at that time the conditions observed were almost identical. At that time the patient had refused treatment and had left against advice. In the present illness a single bronchoscopic procedure for examination and treatment was carried out. No appreciable bronchial stenosis was noted. Penicillin was given, and for postural drainage the patient remained in Fowler's position day and night. After seven weeks of treatment the discharge of sputum had abated and the abscess and most of the associated pneumonitis had cleared. Right upper lobectomy was then performed. The operation and subsequent course were uneventful. Save for the prolonged period of preparation, the operative risk and danger of postoperative complications would have been considerably greater.

In addition, the method of treatment outlined is helpful in determining whether malignant disease is or is not present, for although pneumonitis distal to a carcinoma often improves definitely, seldom does it clear as quickly as it does when the abscess is non-neoplastic. If improvement does not occur promptly, or if clearing is incomplete, lobectomy-biopsy is usually indicated.

Two patients, one 61 years of age, the other 58, had symptoms of abscess of the lung. Both had good clinical response to treatment, but in neither case was clearing, during a two-week observation period, as great as was to be expected with simple abscess. Both were subjected to lobectomy-biopsy. One had a carcinoma 1 cm. in diameter obstructing a segmental bronchus; the other had pneumonitis with bronchiectatic changes.

Aside from the opportunity of increasing the chance of cure in carcinoma, the wisdom of choosing resection rather than surgical drainage in cases in which there is not good response to nonsurgical measures, has been indicated by a number of reports which have recently appeared in the literature. Not only is the mortality rate definitely lower, but the incidence of cure—that is, recovery without chronic disease—is considerably higher. Neerken and Grow[4] subjected 38 patients to resection with a mortality rate of 7.9 per cent. Shaw,[6] and Shaw and Paulson,[9] by increasing the use of resection reduced the mortality rate from 15.2 per cent to 3.5 per cent and increased the cure rate from 57.6 per cent to 82.7 per cent. Kent and Ashburn had similar experience. In a relatively few cases, conservative therapy is ineffective, and in such cases surgical drainage must be carried out, either with a view to cure or in preparation for resection.

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Diagnostic Problems of Cancer of the Lung

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SUMMARY

There are three techniques of primary significance to the diagnostic problems of cancer of the lung.

Roentgenologic evidence is suggestive but not conclusive unless confirmed by other means. Because pulmonary cancer masquerades, morphologic proof is needed.

In some cases bronchoscopy can provide proof, but its usefulness is limited to lesions in the major bronchi.

For the third technique, cytologic study, to be effective, apparently it is necessary only that there be a free passageway between the trachea and the tumor body.

Cytologic studies were carried out in 2,066 cases of all types of diseases of the chest. In 241 of these cases bronchogenic carcinoma was proved by one means or another; the presence of cancer was diagnosed by cytologic methods in 55 per cent of the 241 cases. When five specimens of sputum from each patient were examined, the efficiency of the technique rose to 90 per cent.

Wider application of this simple and relatively inexpensive technique may greatly aid in the solution of diagnostic problems of pulmonary cancer.

EVEN if the apparent increase in the incidence of cancer of the lung should prove to be an illusion owing to improved clinical diagnosis and an aging population, the fact remains that this disease is rapidly becoming one of the most urgent problems in modern medicine. As nearly as can be judged, the number of deaths from pulmonary cancer in every year since 1940 has increased from 5 to 10 per cent over the previous year. It was estimated that over 13,000 people in the United States died of the disease in 1950, and there is every reason to anticipate further increase. As about three-fourths of those who died of cancer of the lung were men over 40 years of age, it is obvious that the disease rivals, and will perhaps exceed, tuberculosis as the chief cause of death in adult males.

Cancer of the lung is not a hopeless condition; a large number of five-year "cures" by means of total pneumonectomy have already been recorded.[2, 7] The surgical techniques involved in pneumonectomy have been constantly improved until almost any patient who is not acutely ill is able to withstand the operative procedure. A number of surgeons, exercising a minimum of selection so far as age and physical condition are concerned, have reported operative mortality of less than 10 per cent in large series of patients. The operation today frequently includes procedures not carried out fifteen years ago; invaded areas of the diaphragm, of the chest wall and even of the pericardium may be removed with one lung.

It would seem, however, that further important advances in surgical and anesthetic techniques for pneumonectomy are unlikely, and no great increase in the number of "cures" can reasonably be expected to result from improvements in these procedures. Surgeons and anesthesiologists have gone about as far as they can in the treatment of bronchogenic carcinoma, and the over-all five-year survival rate remains considerably less than 10 per cent.

Because carcinoma of the lung metastasizes so readily, many patients are beyond the help of surgical treatment before the first symptom appears. More efficient diagnosis, then, appears to be the key to increasing the survival rate.

The diagnostic problem in lung cancer, however, is made unusually difficult by the fact that the tumor itself, so long as it has not fatally extended into adjacent structures, and so long as it is not complicated by secondary conditions, produces in many instances minimal signs and symptoms, or none at all. The patient may notice a persistent wheeze resulting from a partially occluded bronchus, and he may vaguely be aware of a moderate loss of strength and loss of weight. After atelectasis has developed, there may be some dyspnea noticeable. He is not likely to seek medical attention for such minimal symptoms. Consequently, in the majority of cases, cancer of the lung first comes to medical attention when some secondary, symptom-producing condition has developed. Such secondary conditions quite commonly thoroughly mask the neoplasm.[8]

Until recently, diagnosis of bronchogenic carcinoma depended primarily upon direct vision by means of the bronchoscope and indirect roentgenological visualization. Without minimizing their usefulness, it must be recognized that both techniques have limitations. Fluoroscopic and roentgenologic examinations are generally the first diagnostic aids utilized when there are symptoms and signs of a pathologic process in the thoracic cage. They will confirm the presence of an abnormality in most cases. Unless the tumor body is very small and there are no secondary processes, some pathologic lesion

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will be evident. However, roentgenologic appearances are not specific. Most commonly, atelectasis will be clearly evident, but the tumor may be concealed in the collapsed portion of the lung. Secondary infectious processes very often completely mask the tumor body itself. At times the neoplasm is visible, but appears only as strands along the usual lung markings.

Unless it is recognized that roentgenologic evidence must be subjected to careful evaluation, it can frequently mislead. It is invaluable in establishing that there is a pathologic process present, but it will oftentimes not reveal small uncomplicated tumors. Consequently, a roentgenologic report that no lesion was observed cannot be regarded as excluding bronchogenic carcinoma in the presence of symptoms. If routine roentgenograms are supplemented by tomographic studies and lordotic films, the radiologist will usually be able to distinguish between a neoplasm and infectious process with some confidence. But, even so, roentgenologic evidence alone cannot be depended upon for this distinction. If the patient is a man in the cancer age group, a diagnosis of a non-malignant tumor should be questioned until all attempts to prove malignancy by morphologic means have failed.[6]

On the other hand, the evidence provided by roentgenograms must not be underrated. Morphologic proof of malignancy is always desirable, but there is no means at present whereby it may infallibly be secured. Consequently, an exploratory thoracotomy must sometimes be undertaken when the evidence that a malignant growth exists is primarily roentgenologic.

The usefulness and the limitations of roentgenology in the diagnosis of bronchogenic carcinoma are matters upon which there is more or less general agreement. The potential contribution of bronchoscopy, on the contrary, is widely debated, even though the technique has been in general use for many years. It has been claimed that morphologic evidence of cancer, or reasonably presumptive evidence, can be obtained by bronchoscopy up to 60 per cent of the time. Other studies suggest that bronchoscopy can contribute important information much less frequently—only about 30 per cent of the time. The authors have not been able to establish a diagnosis of bronchogenic carcinoma by means of bronchoscopy alone in more than one-third of cases in which the disease was present.

A technique which permits diagnosis even in one case out of three is, of course, very useful. There is, however, a further question: Does bronchoscopy contribute materially to the discovery of early and operable lesions? It has been stated that "the higher the incidence of positive bronchoscopic biopsies, the lower the number of operable patients." There are two chief difficulties. In the first place, there is an unfortunate inverse ratio observed in bronchoscopy. The nearer the tumor is to the carina, the more easily is it detected and identified by bronchoscopic means; also, the nearer it is to the carina, the less possibility there is of successful pneumonectomy. Peripheral lesions, which are most amenable to operation when they are detected early, because there is no operative difficulty with the bronchial stump and because they less readily involve other vital structures, are entirely outside the range of the bronchoscope. In the second place, physicians frequently hesitate to recommend so elaborate a procedure for minimal signs and symptoms. It is possible, by a program of education, to increase the diagnostic application of bronchoscopy. Its apparently inherent limitations, however, militate against its becoming the kind of routine screening device that is required for any major improvement in the survival rate associated with bronchogenic carcinoma.

The third major technique that has been applied to the diagnosis of bronchogenic carcinoma is cytologic examination of the sputum or bronchial secretions. Developed by Papanicolaou and Traut for use in the diagnosis of cancer of the genital tract in women,[10] its modern application to the problem of cancer of the lung began in 1946.[3, 5, 9] In the short space of five years it has proved of major importance. When certain well-defined conditions are met, it permits a morphologic diagnosis of bronchogenic carcinoma which is as accurate as diagnosis by biopsy. It is, further, the most sensitive technique so far developed.

Cytologic diagnosis is possible because malignant growths tend to throw off large numbers of free cells into adjacent body fluids. This has long been known; such cells when they are released into the blood stream or the lymphatic system are presumably the origin of metastases. A diagnosis of bronchogenic carcinoma depends upon the recognition of such cells in the sputum or bronchial secretions.[5]

In the past four years, the sputum of 2,066 patients with benign and malignant diseases of the lung was examined by this method in the laboratory. Eighty-five per cent of these patients were followed to a definite clinical or pathologic diagnosis. In all cases the cytologic studies were carried out without information as to the clinical status of the patient; the diagnosis was made solely upon the appearance of free cells in the sputum or bronchial specimens. In this group, 241 patients were proved by one means or another to have bronchogenic carcinoma. A positive cytologic diagnosis was made in 55 per cent of the 241 patients. The correct diagnosis was made in 90 per cent of cases when sputum samples were adequate[4]—that is, when the laboratory was provided with fresh sputum samples on five different days.

In addition to this impressive sensitivity, the method has the further advantage of simplicity. The sputum can be collected by the patient, preferably upon awakening in the morning, and smears can be made by a nurse or technician. It is desirable that sputum should be prepared within three hours after being raised, but diagnosis can be made from sputum that has stood for as long as ten hours if the cells have not dried. It is thus perfectly feasible to have a patient suspected of bronchogenic carcinoma

collect the sputum upon arising in the morning and deliver it to the physician's office on his way to work.

The most satisfactory smears result when the sputum is poured upon a watch glass placed against a dark background. When this is done, suspicious flecks of material can be selected for examination. In the authors' experience, malignant cells are most likely to be found in opaque, granular bits of sputum which are white to yellow in color, or in flecks of blood. Care, and some experience, is necessary to distinguish flecks of tissue from food particles.

The suspect material that is selected is then smeared upon three slides which have been previously wiped and marked. The smears must not be permitted to dry; instead, they should be immersed immediately in a fixative solution consisting of equal parts of ether and 95 per cent alcohol. When the slides are to be sent elsewhere for staining, they must be left in the solution for two hours. After this immersion, the slide should be air-dried and prepared for shipping. An interval of seven days can elapse between fixing and staining without any loss of significant cell detail. Particular care must be taken after smearing to prevent slides from coming into contact with each other.

The authors believe that cytologic examination is the most effective approach to accurate and early diagnosis of bronchogenic carcinoma that has yet been developed, but it too has its limitations. It will probably be some time before adequate facilities are widely available. As there is no single criterion indicating malignancy of free cells, diagnosis depends upon expert evaluation of findings. Further, the criteria which have been developed for cytology are by no means identical to the criteria for diagnosis from tissue sections, and therefore physicians must have special training and experience with the technique. These qualifications can be expected to delay the universal application that results so far seem to justify. Further, there is an irreducible element of chance. Not every collection of sputum will contain cancer cells; and since the entire specimen is not smeared, there may be cells in the discarded portion.

Experience to date suggests that this element of chance is minimized when the number of samples is increased to five. On one occasion, no malignant cells were observed until the nineteenth sputum collection, but in general, accuracy is not appreciably increased by an increase in the number of samples beyond five. In a small percentage of cases, certain factors interfere with the shedding of cells into the sputum—for example, a blocked bronchus proximal to the tumor.

It seems beyond doubt, however, that by a conscientious examination of five sputum samples, cancer of the lung can be diagnosed with a minimum of delay in 90 per cent of cases. This is a substantial improvement over any other technique available. Furthermore, since it is a morphologic diagnosis, it can be acted upon with a high degree of assurance. In the authors' experience with 2,066 cases, which included almost every known kind of non-malignant lung disease, the sputum samples were falsely reported to be positive for bronchogenic carcinoma in only two cases. Both of these errors occurred early in the series before the criteria for malignancy had been sharply formulated.

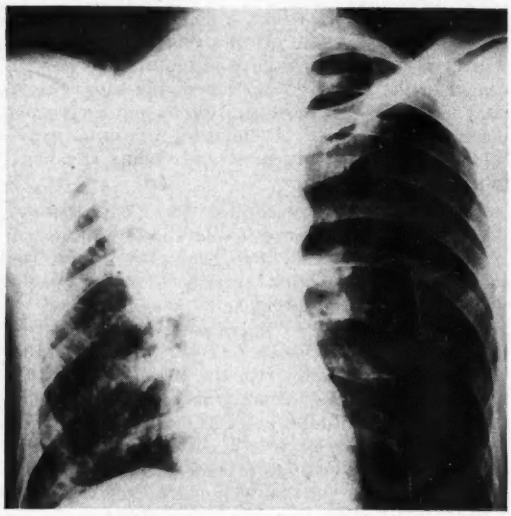

Figure 1

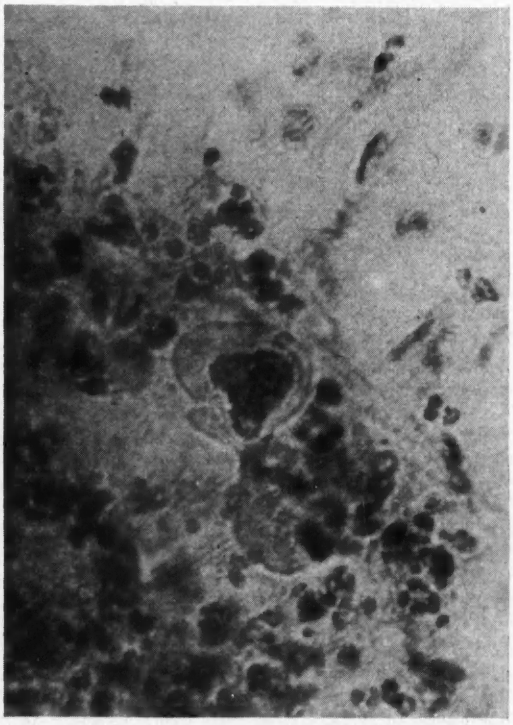

Figure 2

A cytologic diagnosis does not necessarily carry implications regarding operability, as a bronchoscopic diagnosis sometimes tends to do. The detec-

tion of cancer cells in the sputum does not depend upon the closeness of the tumor to the trachea; in fact, one of the great values of the procedure is its applicability to the diagnosis of peripheral lesions. Because it is simple and relatively inexpensive, it can easily be used as a routine screening procedure for any patient in whom cancer of the lung seems even a remote possibility.

The detection of free tumor cells in sputum does not depend upon the size or the age of the neoplasm. In experimental work with rabbits, it was noted that such cells usually appeared in the trachea within three weeks of the time of transplantation of tumor tissue.[1] Such cells were detected in tracheal swabbings in all instances within six weeks of transplantation. In these experiments, recognizable tumor cells were detected before the tumor body was macroscopically visible at autopsy. These experimental results confirmed the clinical observation that an early tumor is at least as likely to be detected by cytologic studies as a late one.

Cytologic examination represents, then, a major contribution toward the solution of diagnostic problems of cancer of the lung, but it is not in itself a solution. Diagnosis must still depend upon clinical judgment and careful evaluation of findings.

The four case histories which follow exemplify the problems and pitfalls. In all cases, roentgen evidence of disease of the chest eventually developed. Bronchoscopic biopsy was possible in only one of the cases, and in that case the need for endoscopic examination was indicated by the observation of malignant cells in the sputum.

In three of the four cases, cytologic studies established a morphologic diagnosis of cancer preoperatively. In the fourth case, only two specimens of sputum were obtained, which constitutes an incomplete examination. The negative result of the (incomplete) examination in that instance in no way forestalled exploratory thoracotomy which led to successful pneumonectomy.

CASE 1.—A 54-year-old white male sign-painter was admitted to the University of California Hospital in February 1948. In 1945 a dry, hacking cough had developed and later it became productive. Some time thereafter pain developed in the upper portion of the right side of the chest. About six months after the onset of the cough, a physician diagnosed "congested lungs" and advised a higher altitude. Right pleural effusion developed in 1947; in 1948 the patient was referred to a tuberculosis sanatorium. When examined, he was emaciated and dyspneic. There was dullness over the right upper chest, with diminished voice sounds, coarse rales and increased tactile fremitus. The liver was enlarged. In an x-ray film of the chest a large homogeneous density was observed in the upper one-third of the right hemithorax (Figure 1), with areas of decreased density within it. Results of cytologic examination of smears of the sputum were positive for carcinoma (Figure 2). At bronchoscopy, the carina was observed to be deformed and the right main bronchus constricted, but biopsy was negative for carcinoma. Smears taken at bronchoscopy, however, were positive for malignant cells. In exploratory thoracotomy the tumor was observed to have grossly involved the chest wall and mediastinum, and pneumonectomy was not performed. The patient died one month after operation.

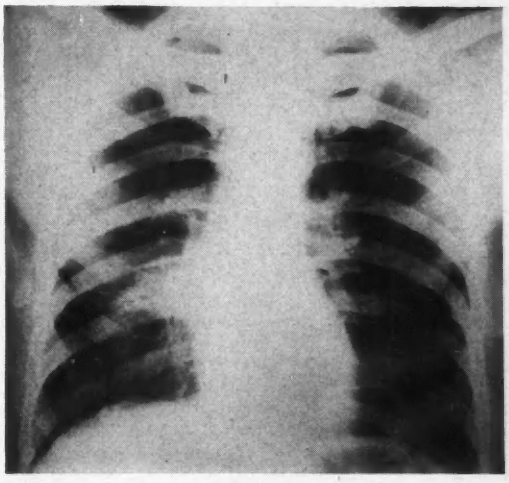

Figure 3

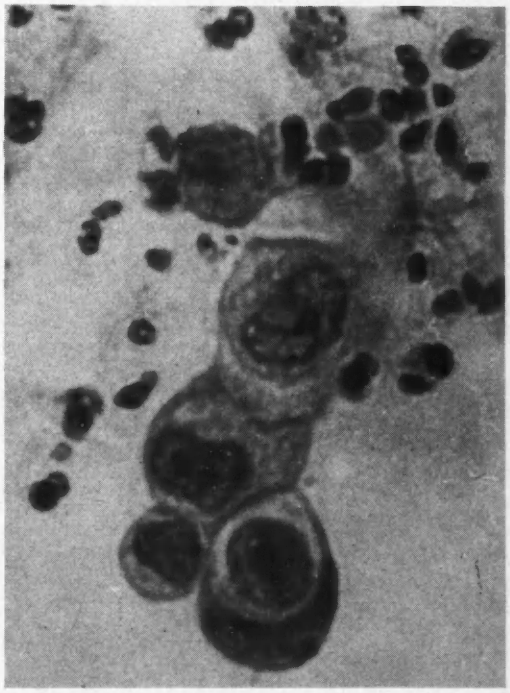

Figure 4

CASE 2.—A 48-year-old Hawaiian porter was admitted to the San Francisco Hospital in October 1947 for ulcer of the leg with a history of cellulitis, lymphangitis and lymphadenitis of the leg. At the time of a previous admittance, in June 1946, x-ray films of the chest were taken and in them it was noted that there was right hilar enlargement with minimal densities in the right apex, "which may be an old acid-fast infection." When he was readmitted, the patient reported a productive cough of one year's duration, with sputum that was occasionally blood-streaked. A decrease of 20 pounds in body weight in that period also was reported.

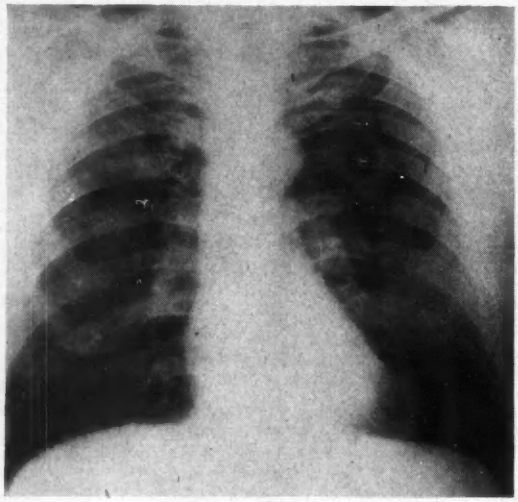

Figure 5

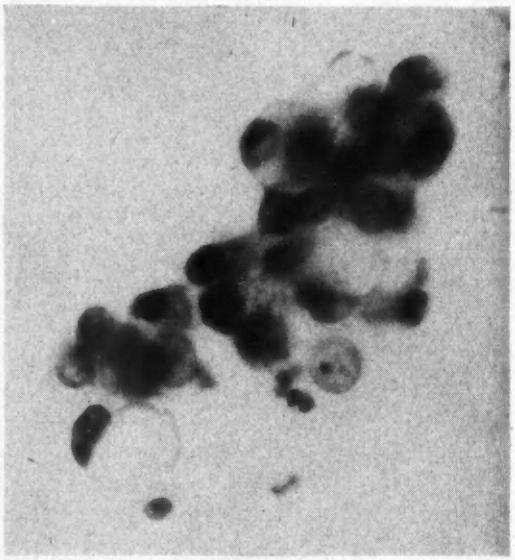

Figure 6

Upon physical examination, clubbing of all extremities was noted. In an x-ray film a small mass in the right hilum, with an area of infiltration surrounding it, was observed (Figure 3). The trachea was slightly displaced to the right. In studies of the sputum malignant cells were noted (Figure 4). At bronchoscopy, a half-dozen white raised projections were observed in the right lower lobe bronchus; these proved to be epidermoid carcinoma. Pneumonectomy was successfully performed a week after diagnosis, and the patient made uneventful recovery. A month later, however, he was returned in a moribund condition and soon died.

* * *

CASE 3.—A 52-year-old white male advertising man was admitted in February 1949, with a history of hemoptysis. After the first attack, in 1947, he had been examined and no abnormalities were noted in bronchoscopic examination or in x-ray films. Four months later another episode of hemoptysis occurred, and three months after that, still another. Bronchoscopic examination was carried out again and no abnormality was observed. Six months later further hemoptysis developed, together with a severe pain in the chest and some dyspnea. Again bronchoscopic examination was fruitless, but in an x-ray film, density of the right third interspace was observed (Figure 5). Cytologic studies were done and malignant cells were noted (Figure 6). The right lung was removed shortly thereafter and papillary adenocarcinoma was observed in the upper lobe. The patient remained free of symptoms for about a year postoperatively, then a metastatic growth appeared on the left seventh rib. Eventual frontal lobotomy was required to relieve pain. The patient died two years after the operation.

* * *

CASE 4.—A 62-year-old white male merchant was well until, two months before admittance in August 1950, he noticed loss of strength and energy. The history was normal except for possible tuberculosis of the right upper lobe 16 years previously, and mild but persistent pain in the right upper anterior area of the thorax for about a year before the examination. Upon physical examination, dullness at the apex of the right lung was noted. In x-ray studies a lesion in the upper lobe of the right lung was observed. When the presumptive diagnosis of reactivated tuberculosis could not be confirmed by a demonstration of bacilli in the sputum, further x-ray examination, including tomograms, was carried out and a large discrete area of density in the right apex was noted. Specimens of sputum were negative for malignant cells on two occasions; and in further bronchoscopic examination no pathologic change was observed. Nevertheless, the roentgenologic and clinical evidence was considered to overrule the negative results of morphologic studies, and exploratory thoracotomy was carried out. A large adenocarcinoma was found in the upper lobe, and right pneumonectomy was performed. At last report, nine months after the operation, the patient was alive and well.

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Conservation of Tissue and Function in Pulmonary Resection

The Technique of the Anatomical Separation of Segments

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SUMMARY

Total ablation of an entire limb to remove a small benign granuloma or tumor is unthinkable. Yet when an entire pulmonary lobe is removed for a similar lesion the sacrifice of normal tissue and function is taken for granted. Operations upon the lung commenced with pneumonectomy, were made more selective by lobectomy, and now can be confined to resection of single pulmonary segments when the diseased area is no more extensive, or to single segments in several lobes if necessary.

Technically the pulmonary segment is the unit of pulmonary resection. The separation of one from another, or even a half of one from the other half, can be accomplished with anatomical accuracy. More widespread use of this operation will provide surgical aid to many bronchiectatic patients who otherwise are afflicted with disease too widespread for cure. It will conserve healthy lung tissue in benign conditions where removal of the diseased area is necessary.

The technical steps of pulmonary segmental resection are outlined and illustrated.

WHY do general practitioners and internists not refer patients with a single round or wedge-shaped mass in the lung for operation? Why do thoracic surgeons remove so much good lung in excising small benign pulmonary lesions? These questions are connected.

When a physician observes a patient with a benign tumor of the hand or arm, or a localized granuloma, or a crippling scar he does not watch the lesion by physical examination and repeated x-ray study for many months. He arranges for surgical removal. If he finds a mass in a woman's breast he doesn't, nowadays, pursue a course of watchful waiting or dismiss the finding as of academic interest only. He insists on immediate surgical removal for a positive early diagnosis and an optimal opportunity for cure if malignant change is present. A localized pulmonary mass, round or wedge-shaped on x-ray examination, cannot be palpated, trans-illuminated, tested for tenderness and so on as can a mass in the breast. With so little information to go on, why should a physician procrastinate and not have biopsy performed early? The principal deterrent is, probably, his consideration of both the risk of pulmonary resection and the extent of resection practised even when the lesion is benign. The risk, once great, is no longer significant in comparison with the potential danger of the lesion itself. The extent of resection, at first total pneumonectomy and later lobectomy, can now be limited to the pulmonary unit or units involved,[5, 7, 8, 9, 10] except when malignant change is present. When physicians recognize these facts they will react to a pulmonary mass as to a tumor of the breast.

Thoracic surgeons should conserve the maximum of normally functioning pulmonary tissue. That not all of them do is owing to a paradox of pulmonary resection. Here, unlike excisional operations upon the brain, limbs, intestine and so on, but perhaps akin to renal operations, it is technically easier to remove an entire lung than a lobe, or a lobe than a segment. Thus it used to be that if surgical removal was to be done, total pneumonectomy was necessary. When lobectomy was mastered, that was the most conservative and function-preserving operation that could be offered. Thoracic surgeons are now in the process of changing to the segment as the unit of pulmonary resection.[2, 3, 5, 6, 7, 8, 9, 10]

Pulmonary segmental resection is valuable not alone for biopsy of a localized mass or for removal of a localized benign process; indeed, perhaps the greatest usefulness of the procedure is in dealing with bronchiectasis.[2, 6, 7, 8, 9] This disease, commonly misdiagnosed as chronic bronchitis, or asthma, is a disease of lung segments. Usually it affects *some* segments of *several* lobes. The only cure for the condition is surgical removal of the diseased areas, but unless a more selective operation than lobectomy is employed, only a small proportion of persons who have the disease can be so treated, for in most cases too many lobes contain involved segments. If only the diseased segments of lobes are removed and the normal tissue of each affected lobe is preserved it is possible to completely remove the bronchiectatic segments in most cases. (See Figure 1.) In typical severe cases, the lingula, the middle lobe, and both lower lobes are involved, but the superior segments of the lower lobes, comprising by volume about three-sevenths of the two lobes, are normal. Each such superior segment is roughly equivalent in size to a middle lobe or to both segments of a lingula. Preservation of these superior segments, which is standard in seg-

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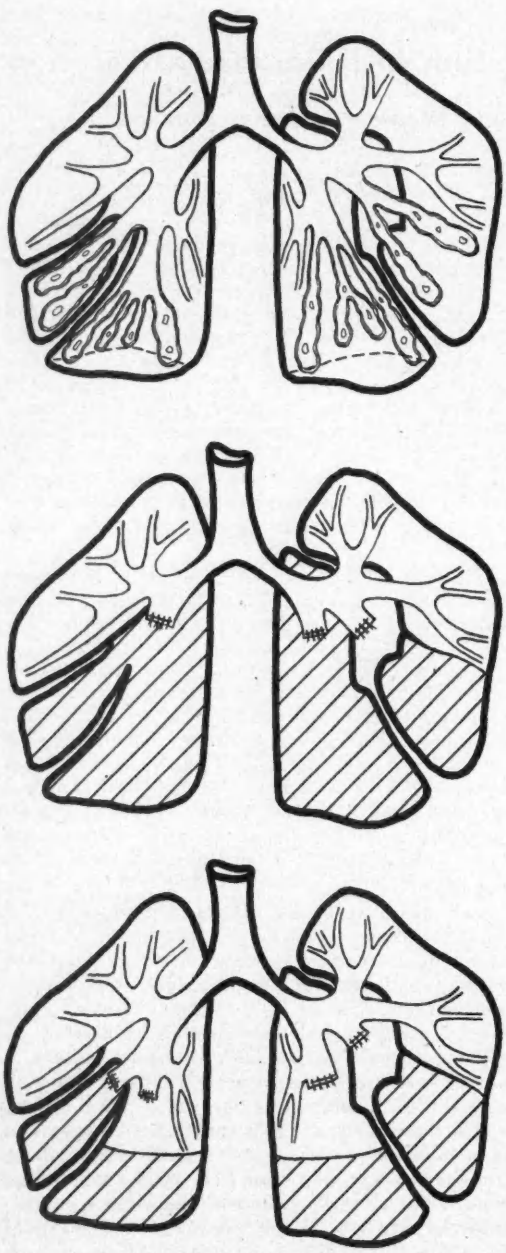

Figure 1.—*Upper*—The common distribution in bilateral bronchiectasis. Note that both lower lobes are involved but the superior segment of each, totaling about three-sevenths by volume, is not involved. The middle lobe and lingula segments are involved. *Middle*—Excision of the involved segments by lobectomy and lingulectomy results in extensive loss of lung tissue, including the normal superior segments of both lower lobes which together aggregate as much tissue as the middle lobe and lingula combined. This excision leaves only six pulmonary segments (equivalent of two right upper lobes) for function. *Lower*—Excision of the diseased segments only preserves the superior segments of the lower lobes and thus leaves the equivalent of two right upper lobes, a middle lobe and a lingula for function.

mental excision,[7, 8, 9] permits removal of both the middle lobe and the lingula with a total tissue loss equivalent to two lower lobes—yet diseased segments have been removed from four lobes. For bronchiectasis of minimal extent but with definite symptoms present, it is no longer necessary to remove half of a lung when only one, or two, segments of one lobe are involved. (See Figure 2.) The preservation of all normal lung tissue is of great value in the patients, most of them young, both for immediate maximum function and for protection from pulmonary insufficiency in case of future pneumonia, emphysema, asthma, bronchogenic carcinoma or cardiac disease.

A field of promise for segmental resection is pulmonary tuberculosis. Here there is often a localized problem, such as a thick-walled cavity or thin-walled tension cavity, which defies more routine therapeutic measures. Often there is sufficient disease of non-cavitary or minimal cavitary nature in the same or opposite lung that thoracoplasty or lobectomy is impracticable. Removal of the one or two segments containing the major lesion will sometimes preserve enough function so that other measures, not otherwise possible, can be utilized to control the remaining disease. In time, segmental resection of localized cavities may become the treatment of choice, since the two methods now commonly used—collapse of a lobe or removal of a lobe—result in extensive loss of function. Such a development will be greatly forwarded by discovery of an antibiotic even more effective than is streptomycin.

ANATOMY

Both physiologically and technically the separation of one part of a lobe from the remainder is dependent upon anatomic factors.[1, 2, 3, 9] These are: (1) the fundamental unit of gross pulmonary structure, and (2) the peripheral nature of the venous drainage of such units.

The fundamental unit is considered to be a conical structure of pulmonary parenchyma which has a central bronchus and artery of supply and a network of veins, arranged peripherally and converging at the apex of the cone where the bronchus and artery enter.[1, 9] The actual size of this fundamental unit has not been determined (so far as is known to the author), but all bronchovascular segments contain at least two and many at least four. A quarter of a single segment is probably the smallest portion of lung that it is practical to remove for excision of a diseased process, and further divisions down the scale need concern us, surgically, no further. Whether or not the fundamental unit has a central vein is not known, but it is not unlikely.

Two or more fundamental units are always combined to form larger units. When they do so the peripheral veins at the points of contact mark the borderline between individual units; therefore they can be called inter-unitary veins. Theoretically, then, regardless of the size, any unit can be separated from its neighbor by locating the inter-

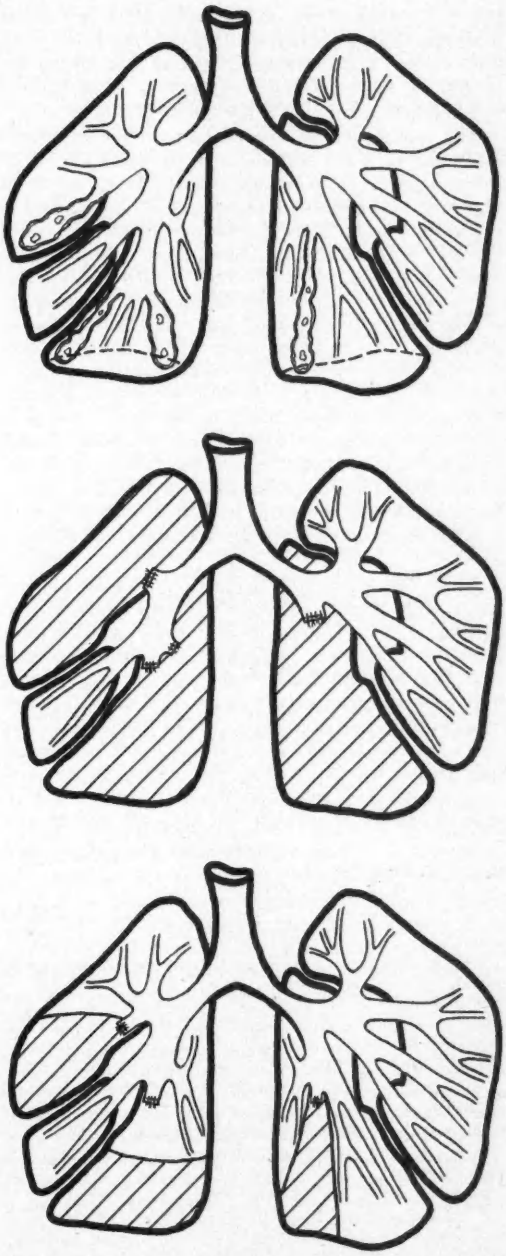

Figure 2. — Illustrating the extreme waste of normal functioning lung that can occur if lobectomy is used rather than segmental excision. Bronchiectasis is a disease of some segments in various lobes. *Upper*—Scattered bronchiectasis, involving four segments in three lobes. *Middle*—Excision of the diseased areas by lobectomy involves the removal of three entire lobes, leaving only a complete left upper lobe and a middle lobe for function. *Lower*—Excision of the diseased areas by segmental resection, preserving nearly all the normal lung. Note: It is quite feasible to remove only the two diseased basal segments of the right lower lobe, but here the remaining two might become rotated or displaced with resulting bronchial obstruction and disease so that often if two basal segments are diseased all are removed. In some circumstances the surgeon might elect to preserve all the normal segments.

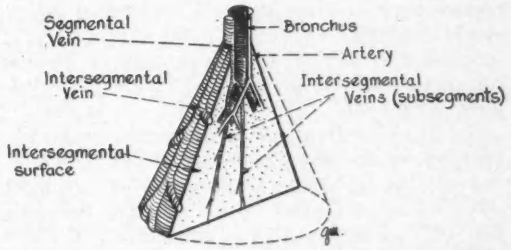

Figure 3. — A bronchovascular segment, in this case formed from four "units." The segmental bronchus and artery enter at the apex of the segmental cone. Their branches enter the apices of the component "units." The principal venous drainage is peripheral with several trunks converging at the apex. These trunks run in the plane between this and any adjacent segment and therefore are called intersegmental veins. They can be located at the segmental hilum and followed peripherally as guides to the cleavage plane between adjacent segments. A smaller vein can be seen adjoining the central bronchus and artery at the apex; it is called the segmental vein. If traced into the segment its branches can be seen to come from the junction surfaces of the component units. The branches are therefore inter-unitary veins. (Modified from Figure 2, Reference Number 9.)

unitary vein and following it and its branches in the plane of separation.

When two fundamental units are thus combined, there is formed a structure with (1) peripheral veins on the noncontact surfaces converging on the common hilum, (2) one or more veins running between the formative units at the plane of contact (inter-unitary veins), (3) a junction of the peripheral veins and the inter-unitary veins at the hilum to form a common trunk, (4) a bronchus of supply for each unit at the hilum combining to form a single bronchus, and (5) an artery of supply for each unit combining to form a single artery. Thus the combination unit has a central artery and bronchus and peripheral and inter-unitary veins.

When more than two units unite, the same principle is found. Two or more groups of fundamental units may combine to form segments or lobes of any size. A group of any size will have a single bronchus, an artery, and two types of veins—peripheral veins, marking the group off from adjacent groups, and central veins constituting one or more inter-unitary veins. The central vein will often be found with the group bronchus and artery.

The largest components of any lobe are the bronchovascular segments. These have been named and the bronchus of supply is of the third order, after the main stem bronchus and the lobar bronchus. This is the lobar subdivision which is generally referred to by the term "segment" (Figure 3). Like any smaller group of lung units, it has centrally a (segmental) bronchus, (segmental) artery, often a (segmental) vein and peripheral veins converging on the hilum. Some peripheral veins mark the plane of separation from a contiguous segment and are known as intersegmental veins; the remaining are covered by pleura and are called subpleural.

Vein Classification:

Central — a. — The segmental vein[9] originating from inter-unitary veins of smaller units or groups

(subsegments). It accompanies the central artery and bronchus.

Peripheral—a.—The intersegmental vein[1,9] which runs peripherally in the plane of junction with adjoining segments.

b.—The subpleural vein which runs peripherally on a free surface and is covered with pleura.

A subsegment is a smaller portion of a segment and may be of various orders of segmental division. All subsegments have the unitary structure described above.

SURGICAL SEPARATION

Surgical separation of a segment (or subsegment) consists essentially of division of the central structures (segmental bronchus, segmental artery and segmental vein, if present), any subpleural veins, and then the separation from contiguous segments (or subsegments) by locating the intersegmental vein (or veins) at the segmental hilum and following it and its branches along the plane of fusion, dividing the small venous tributaries as they are encountered. This having been accomplished to the pleural surface, the segmental resection has been completed. Occasionally circumstances will be found which will make preferable a variation in the order of the steps outlined.

In performing the procedure outlined in the preceding paragraphs, certain natural aids are employed. The diseased segment is usually apparent by inspection or palpation; occasionally bronchographic evidence only is of assistance. Since the segmental bronchus contains cartilage it can be palpated with ease and followed by touch into the segment until there is no doubt that it supplies the diseased segment. This having been carefully done the bronchus is dissected, clamped distally, sectioned near its origin, and the proximal stump sutured closed. The segmental artery accompanies the bronchus and is therefore exposed during the dissection of the bronchus. It is doubly ligated and divided when encountered. Any subpleural veins and/or segmental veins which are present are doubly ligated and divided as they become evident. The segment is then detached from the adjacent lung parenchyma by using the intersegmental vein as a guide to the plane of separation.

How is the intersegmental vein, of a given plane, recognized? The answer is: By anatomical details. Dissection must be at the hilum of the segment being removed; otherwise the incorrect bronchus, artery and veins will be found—structures belonging to segments or subsegments of a higher or lower order. Commencing with the correct bronchus will make evident the hilum of the diseased segment. At this hilum, as was pointed out in the anatomical discussion, there may be found one or more segmental veins, or subpleural veins, or intersegmental veins. Any vein discovered by gentle dissection at the segmental hilum should be followed distally for a short distance. If it follows the segmental bronchus and artery closely into the center of the segment, it is a segmental vein; if it does not, but runs subpleurally, it is a subpleural vein. If it does not follow either of those courses nor any other bronchus or artery, but passes into the parenchyma at the approximate junction of neighboring segments, it is the intersegmental vein.

The intersegmental vein is then followed peripherally between the segments. In most instances the intersegmental vein arises equally from adjacent segments and should be preserved by dissecting between the vein and the diseased segment. Following the vein is facilitated by flattening out the intersegmental plane by the use of mild positive intrabronchial pressure—the anesthetist does this—and applying lateral divergent pressure on the margins of the plane. Care must be taken not to put too much traction on the diseased segment, lest the veins be rendered bloodless and difficult to follow. Separation of the surfaces should be by gentle pressure with the fingertip or the blunt end of scissors. Small venous tributaries and any fibrous strands should be divided with scissors as encountered, since undue traction on them is transmitted to the adjacent healthy segment with resultant trauma and leakage of air.

After the segmental separation has been completed, the pleura is divided and the segment discarded. Usually there are a few small venous branches that must be ligated and several places that leak air. Small air leaks can be disregarded, but vigorous ones usually come from tears in small bronchi with cartilage in the walls. These may persist as fistulas unless ligated closed. Nothing further then remains to be done to the intersegmental surface, except that in tuberculosis it may be advisable to cover the exposed surface with free pleura.

The after-care of patients does not differ from that following lobectomy.

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The Early Diagnosis of Carcinoma of the Stomach

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SUMMARY

The insidious nature of carcinoma of the stomach has induced a pessimistic attitude in the medical profession, for by the time the unmistakable signs of malignant disease become evident, the patient is doomed. Improvement in results of the surgical treatment of gastric carcinoma will come only with early diagnosis, which is in turn dependent upon appreciation of the gravity of recognizable epigastric distress and the application of the available diagnostic procedures to aid in the diagnosis of malignant lesions in the early, preinvasive stages.

Recognition of the significant risk of malignant change in gastric ulcers is essential, for a high degree of suspicion in the presence of the symptoms of ulcer can lead to diagnosis of malignant lesions at a stage when resection can cure.

THE intellectual effort applied to the fundamental problems of gastric surgery has produced favorable results during the past decade. But the brilliance of these achievements is dulled by the realization that there has been no notable increase in the number of cases in which gastric carcinoma is operated upon in an early stage, and no significant increase in the number of patients who have survived for a five-year period after surgical treatment for carcinoma of the stomach. The obscurity of its symptoms and the limitations of present diagnostic methods make carcinoma of the stomach one of the most depressing phases of the whole problem of cancer. It must be acknowledged, however, that many early lesions remain undetected from lack of effort and attention directed toward their discovery and recognition.

A significant improvement in the operative mortality rates for gastric cancer has been observed at the University of California Hospital. Upon analysis of the case histories of 540 patients operated upon in an 18-year period, it was noted that during the last five years of the 18-year span the mortality rate was 11.9 per cent as compared with 22.2 per cent during the earlier years.[1] At the same time, it is readily apparent that the patients who survived five years or more (19.2 per cent) were the patients who had had lesions that were located in a "favorable" position in the stomach—that is, in the pyloric portion. Tumors arising in this area cause symptoms at a relatively early stage in their development, mainly by obstruction to the flow of gastric contents. Lesions located elsewhere in the stomach may be practically symptomless well into the advanced stages (Figure 1). As the outcome of surgical treatment depends upon the presence or absence of metastases, the problem resolves itself into one of detecting the tumor in the initial stage of development.

Since the present diagnostic methods are limited in scope and frequently permit only incomplete conclusions, it is mandatory that physicians recognize the symptoms that warn of early carcinoma. No typical pattern is discernible in the recorded symptomatology which covers a multitude of complaints, including various degrees and descriptions of indigestion, dyspepsia, epigastric distress, anorexia, gaseous eructation, heartburn, easy fatigue, dysphagia, nausea, vomiting, hematemesis, malaise and loss of weight. Obviously, no one of the various symptoms is a specific one for carcinoma of the stomach. As Moynihan[2] so aptly said, "One wonders whether all the patients exhibiting such a confusing array of symptoms could possibly have the same disease."

Unfortunately, most of the symptoms caused by carcinoma of the stomach can be classed as simple dyspepsia; but therein lies the entire story of the early diagnosis of gastric cancer. The possible gravity of mild degrees of epigastric distress cannot be too strongly emphasized.

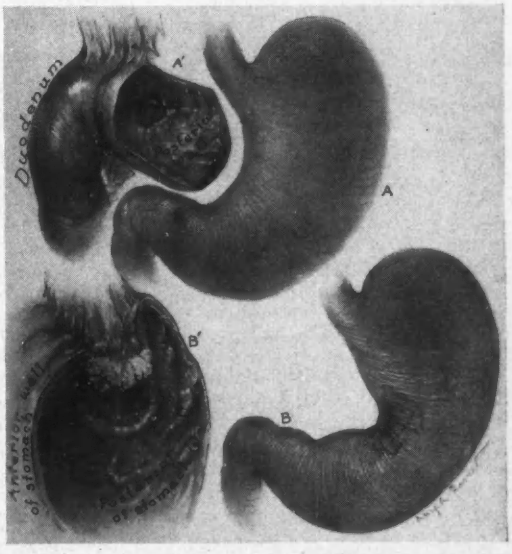

Figure 1.—*A*—As the prepyloric region is narrow, malignant lesions there can be recognized early by the obstructive symptoms produced. *B*—The spacious lumen of the stomach elsewhere can accommodate far advanced carcinoma without producing definitely recognizable symptoms.

From the Division of Surgery, University of California School of Medicine, San Francisco.

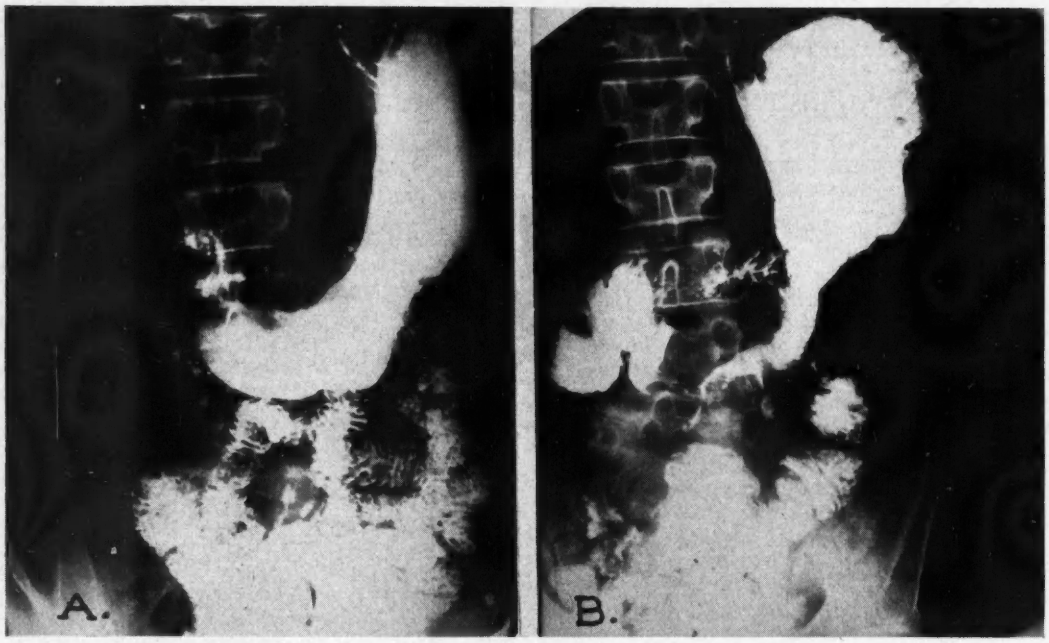

Figure 2.—*A*—Peristaltic action appeared normal through the suspicious area on the greater curvature. *B*—Two years later, after constant gastric distress, the diagnosis was obvious but too late.

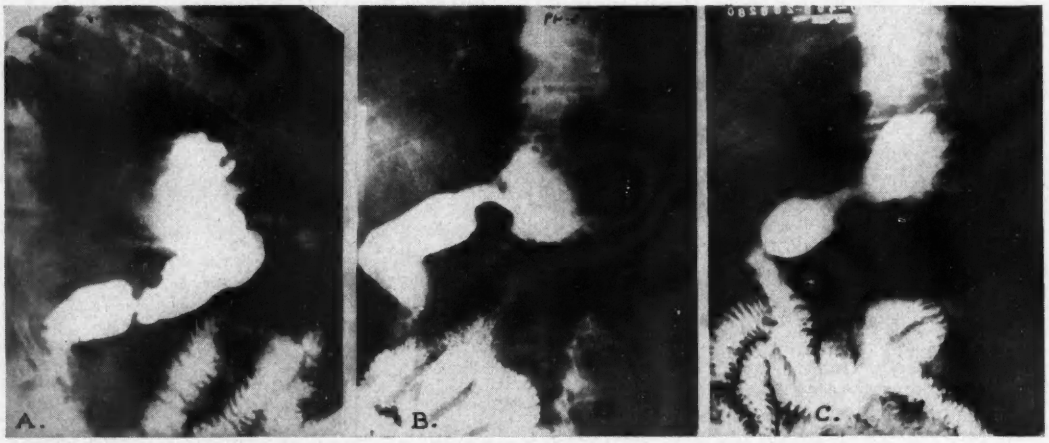

Figure 3.—*A*—The original roentgen film was interpreted as within normal limits. In spite of continued epigastric distress, five months elapsed before a second barium study, *B*, was performed. One month later, *C*, exploratory laparotomy was recommended.

Oftentimes the patient becomes aware of gastric discomfort only after it has recurred with increasing frequency and intensity. Hence, the greater the sensitivity of the patient to his own distress, the greater will be the opportunity for the detection of gastric carcinoma while it is still confined to the site of origin. Symptoms that are sufficient to cause the patient to consult a physician must be regarded with alarm. It is a physician's responsibility when confronted with mild degrees of gastric discomfort to suspect carcinoma and make a diligent effort to detect it. Even without definite proof of malignant disease, continuing symptoms constitute highly suspicious danger signals. The number of cases in which carcinoma of the stomach metastasizes and therefore becomes incurable while the patient is receiving symptomatic treatment is probably more than even the highest estimate would indicate.

The current effort on the part of investigators to discover some new technical device for the detection of gastric carcinoma is commendable and necessary, for the search must be a never-ending one. Practicing physicians, however, must assume

the responsibility of establishing an early diagnosis by utilizing methods currently available. It must be recognized that the diagnostic procedures now in use are adequate for the diagnosis of carcinoma of the stomach for very many more patients than those to whom they are applied.

Roentgen study of the stomach suffices in at least 95 per cent of cases to provide a diagnosis of carcinoma of the stomach. However, this high percentage is merely evidence of the advanced state that the lesion has reached before precise methods of diagnosis are instituted. Suspicious symptoms call for immediate evaluation by x-ray and, especially when they persist, for careful follow-up. A patient observed by the authors, a man aged 42, had vague epigastric distress for two months. Roentgen studies of the stomach were reported as nonconclusive with respect to organic disease. Even though symptoms continued, the patient thought it unnecessary to return because of the original roentgen report. When operation finally was performed two years later, complete excision of the tumor could be accomplished only by total gastric resection (Figure 2). Another patient, a man aged 56, with a positive serologic test for syphilis, was treated symptomatically for six months because the original roentgen film was reported as showing no organic disease. In spite of continued symptoms a relatively high grade gastric obstruction developed by the time operation was recommended (Figure 3).

A patient with suspicious symptoms must not be lulled into a sense of security by a negative report after a single x-ray examination. The radiologist is not responsible for the management of such patients; it is the clinician who must be constantly aware of the malignant potential of continuing or recurrent symptoms referable to the stomach. The absolute necessity of repeated roentgen examinations in such circumstances cannot be stressed too strongly.

Periodic roentgen examinations are advisable for patients who have pernicious anemia, since certain changes in the gastric mucosa associated with that disease apparently predispose to the development of carcinoma. Rigler,[3] who examined a large series of patients roentgenologically at intervals of six months, noted gastric cancer in 18 and polyps in the stomach in 17 of 259 patients with pernicious anemia studied. Patients who have histamine-proved gastric anacidity should probably undergo similar studies since a significant number of them have atrophic gastric mucosa which seems to bear some relationship to the development of cancer of the stomach.

In the event of equivocal or even negative roentgenologic findings, in the presence of continued symptoms, direct inspection of the stomach by gastroscopy may provide evidence not obtained by any other method. However, as with all laboratory procedures, the value of gastroscopy is in direct proportion to the skill and experience of the examiner. The evidence thus obtained is not absolutely dependable when taken alone, but positive findings, when added to doubtful radiographic evidence, are of great value (Figure 4).

Figure 4.—The small malignant ulcer is evident on gastroscopic study. *Left*—Note the rolled, raised margins and the partially necrotic ulcer base. *Right*—A prepyloric polypoid malignant mass encroaches upon the pyloric canal as seen through the gastroscope.

In recent years, the cytological examination of gastric contents has emerged as a provocative innovation in the never-ending search for a means of obtaining an early diagnosis of carcinoma of the stomach. More and more patients are being investigated by this technique, but it is generally acknowledged that 60 per cent is the maximum of diagnostic accuracy obtainable up to the present.[4] Until greater accuracy can be achieved, this procedure cannot be relied on to solve the urgent problem of the early diagnosis of gastric cancer.

A challenge to medicine is the malignant gastric lesion that heralds its presence early by causing symptoms typical of an ulcer, for here lies hope of detecting carcinoma at a curable stage. The reported incidence of malignant change in gastric ulcers varies considerably, but most observers agree that carcinomatous changes may occur. An opposing opinion suggests that both the ulcer-like symptoms and the pathologic features are attributable to ulceration at the site of a primary carcinoma of the stomach. In any event, the etiologic sequence is of little moment beside the fact that in many instances a readily resectable malignant lesion is permitted to reach a most unfavorable state while prolonged injudicious conservative therapy is carried out. A man 45 years of age who was observed by the authors had symptoms of gastric ulcer for seven years. In roentgen films taken in 1941 a suspicious area in the pyloric antrum was noted. Thereafter the patient was under continuous medical observation elsewhere, with repeated x-ray examinations, for five years. Between October 1941 and March 1946, no fewer than ten roentgen studies of the stomach, each demonstrating a persistent lesion in the pyloric antrum, were performed before the probability of malignant disease was considered (Figure 5). The likelihood of malignant change in any case of gastric ulcer cannot be too strongly emphasized.

It is sometimes said that the risk of an operative procedure for a gastric ulcer is greater than the possibility of the lesion's being malignant. This fortunately is untrue. In most recent published reports the mortality rates are in the neighborhood of 5 per cent or less. In a group of 99 patients of all age groups who underwent subtotal gastrectomy for

Figure 5.—Roentgenograms of a patient who had symptoms of gastric ulcer for a period of seven years. Despite the presence of a persistent prepyloric lesion, conservative therapy was continued for five years before operation was considered. A resectable lesion was permitted to reach a most unfavorable stage.

benign gastric ulcer at the University of California Hospital, there were but five deaths, a mortality figure just over 5 per cent.[5] In 24 cases of malignant gastric ulcer there was but one death, comprising a combined mortality rate of 4.8 per cent. It is important to contrast these figures with the generally acknowledged fact that from 10 to 20 per cent of ulcers of the stomach are malignant rather than benign.

Some of the factors which point toward possible malignancy in a gastric ulcer are the absence of free gastric acid, short duration of symptoms, an ulcer crater greater than 2.5 cm. in diameter and one located in the prepyloric region, along the greater curvature or high on the posterior wall of the stomach. None of these criteria can be considered specific, however, and their reliability for differential diagnosis in an individual patient must be questioned. If the several investigative procedures yield equivocal results in the examination of a patient with a gastric ulcer, operation should be done immediately, for in such circumstances the patient should not be denied the certainty of diagnosis that can be obtained thereby.

Concern for the patient with mild symptoms, assiduous application of diagnostic procedures and the discovery of carcinoma at an early stage are only part of a physician's responsibility. He must, in addition, be alert to the fact that mere suspicion of gastric carcinoma constitutes an indication for prompt surgical intervention. Cancer of the stomach often defies detection by any means except direct inspection at operation or microscopic examination. To await exact clinical signs is to invite disaster. Suspicious symptoms, especially if they persist, are adequate justification for exploratory laparotomy or for excision of a recalcitrant gastric ulcer.

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Observations on Aortic Embolism

With Report of Thirteen Additional Cases

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SUMMARY

Complete obstruction of the circulation to the lower extremities by lodgement of an embolus at the bifurcation of the aorta requires early surgical intervention if life is to be preserved and function retained.

A summary of thirteen cases of aortic embolism is presented, including three apparently new etiologic factors. The literature is reviewed, and current cases compared with previously reported cases. A detailed report of aortic saddle embolus arising from auricular fibrillation in the absence of organic heart disease, and with complete return to health and heavy work, is reported.

RAPID advance has been made in the past two decades in the surgical treatment of arterial embolism, a condition first recognized by Virchow[12] in 1845. The first successful embolectomy, for femoral embolism, was reported by Labey[7] in 1911, and the treatment of arterial emboli is now commonplace. There is still some disagreement as to what levels of embolism should be operated upon, but it is rather generally accepted that complete occlusion of the aorta and common iliac arteries by emboli must be surgically relieved if there is reasonable expectation that the patient can tolerate the procedure.

MATERIAL

The present study is of 13 cases of aortic saddle embolus, 12 in patients observed in the past 15 years at Los Angeles County Hospital, and one in a patient treated in private practice.

These cases, added to 193 noted by Albright and Leonard[1] in a review of the literature in 1950 and three others subsequently reported by Burgess and Hartwell,[3] Wilson[14] and Massell,[9] bring the total reported number to date to 209. One hundred fifty-four of the patients died, and of the 55 who survived 31 were treated by aortic embolectomy—direct aortotomy in 13 cases and indirect in the other 18 (see Table 1).

In the present series one of the three patients who survived was treated conservatively and had much residual functional impairment. The other two were treated by direct aortotomy. One returned to normal activities after multiple embolectomies and bilateral amputation, and one (the case is reported in full herein) returned to work as a carpenter.

The longest interval between onset of embolism and beginning of treatment was 48 hours, the shortest two hours, and the average 12.9 hours. Five of the 13 patients, moribund when first observed, died within 24 hours. Of the remaining eight, four were treated by direct aortotomy, one by indirect embolectomy, and three conservatively. Two of the four patients subjected to direct aortotomy died and two recovered. The patient on whom indirect embolectomy was done died 35 days after operation. Of the three treated non-surgically, two died within eight days and one survived with total disability. Contributory causes of death in addition to aortic embolism are listed in Table 2.

ETIOLOGICAL FACTORS

Three associated etiological factors not previously described were noted in the present series:

1. *Trichinosis of the myocardium.* Multiple emboli developed in one patient during stormy convalescence from trichinosis. Embolectomy of both iliac arteries and one femoral artery was partially successful. At autopsy, the source of emboli was noted to be left ventricular mural thrombi apparently due to trichinosis of the adjacent myocardium.

2. *Syphilitic aortic plaques.* Large aortic mural thrombi caused by syphilitic plaques were the source of emboli in one case.

3. *Auricular fibrillation in the absence of organic heart disease.* The patient in whom this phenomenon was noted was completely restored to health by surgical treatment (see case report). As auricular fibrillation without organic cardiac disease has been frequently noted (Phillips and Levine[11]), it is felt that perhaps in cases of embolism on this basis the prognosis may be considered favorable, in view of the outcome in the present instance.

As to other, previously described, associated factors, they were noted in this series in the incidence indicated in Table 3.

DIAGNOSIS

The clinical and differential diagnosis of emboli of the aortic bifurcation is not difficult if the criteria,[9, 10, 13] are kept in mind: cold, pallor, pulselessness, pain, paresthesia and paresis, involving the lower extremities more or less symmetrically. Usually, if occlusion is complete, there will be little or no pulsation from the inguinal ligament down; pallor and temperature change will be manifest in the middle one-third of each thigh; paresthesia

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TABLE 1.—*Reports of Cases of Aortic Embolism at Bifurcation*

Source	Number	Deaths	Recovered Patients			
			Amputations	Conservative treatment	Surgical: Direct	Surgical: Indirect
Albright & Leonard review of literature	193	144	11	8	8	18
Burgess & Hartwell	1	....	....	....	1	....
Wilson	1	....	....	....	1	....
Massell	1	....	1	....	1	....
Present Study	13	10	1	1	2	....
	209	154	13	9	13	18

and paresis will be proportional to the degree of ischemia in various nerves and muscle groups.

An oscillometer or an aneroid sphygmomanometer is of great value in the observation of these criteria.

TREATMENT

If there is doubt about the diagnosis, or about the patient's ability to survive operation, conservative treatment, about which much has been written, [2, 5, 6, 9] must be carried on until these doubts are cleared. If occlusion and arteriospasm, which may extend progressively into the collateral vessels, have not been present over four to five hours, surely time will be well spent for spinal or sympathetic block to determine whether the cold level and pulse will not progress further into the extremities.

As to technical aspects, the operation can be performed in any hospital with adequate facilities for average laparotomy. Arterial silk or nylon, 5-0 or 6-0, swaged on fine needles, and a few lengths of soft rubber tubing are necessary. Expert anesthesia is of paramount importance. The choice of transabdominal or retroperitoneal exposure rests with the surgeon. Retroperitoneal exposure provides adequate working room and accessibility to one sympathetic chain, with minimal postoperative ileus. It is not necessary to completely mobilize the vessels in order to pull the tourniquets into place with blunt-nosed, right-angled clamps. Postoperative treatment consists of all proven measures of effective arterial spasmolysis and anticoagulant therapy, plus supportive treatment as indicated, especially for the heart. The extremities should be neither raised nor lowered, and should be kept cool but not cold. Progress is determined by skin color and temperature, return of function, and especially by frequent oscillometric determinations.

It is felt that the results in the series here reported are at least comparable to those in previously published reports, particularly in view of the fact that each case was managed by a different surgeon and most of the patients appeared to be moribund when first observed.

Prophylaxis of arterial emboli has now reached a significant phase. Anticoagulants are more frequently being used in various cardiac conditions; and one of the most recent measures is resection or ligation of the left auricular appendage to prevent recurrence, as suggested by Dock and practiced by Madden[8] and Baranefsky.[3] Although the latter measure seems rather heroic, it becomes obvious that in at least some cases in which warning had been given by the occurrence of previous minor emboli the patients might have been saved by this prophylactic procedure. In six of the 13 cases in the present series there had been previous emboli.

TABLE 2.—*Causes of Death in Addition to Aortic Embolism (Cardiac Failure Contributory in All Cases)*

	No. of Instances
Cerebral embolus	5
Peritonitis, ruptured appendix	1
Shock	1
Anuria (postoperative) and possibly renal embolism	1
Retrograde propagation of clots	1
Coronary occlusion (repeated)	1
Mesenteric embolism	1

TABLE 3.—*Incidence, in Present Series, of Associated Etiologic Factors Previously Reported by Other Investigators*

	No. of Cases
Auricular fibrillation:	
Rheumatic heart disease	5
Arteriosclerotic heart disease	1
Hypertensive heart disease	1
Thyrotoxicosis with heart disease	0
Coronary occlusion:	
Myocardial infarction with mural thrombus	3
Paradoxical embolus from venous thrombosis and patent foramen ovale	0
Previous arterial embolism	8 times in 6 cases

CASE REPORT

A 40-year-old carpenter was first observed at noon on February 24, 1950, five hours after onset of prostrating pain from the waist down which was not controlled by an opiate. Members of the family said the patient had a quart of whiskey and three packs of cigarettes a day for ten years. He had had an occlusion of the left anterior tibial artery one year before, with minimal sequelae.

On examination, the blood pressure seemed elevated in the arms, and it was undiscernible in the lower extremities. There was pronounced irregularity of pulse, with a pulse deficit of 10. The lower extremities were cold, pale, and cadaverous in appearance. No oscillations were present from the groins down. Aortic pulsations were easily palpable, but there were no pulsations below the umbilicus. Deep reflexes were exaggerated in the upper extremities, absent in the lower. No other abnormalities were observed in physical examination and in laboratory tests, except for a prothrombin concentration of 49 per cent of normal.

Diagnosis of saddle embolism at aortic bifurcation seemed established. Priscoline® and Papaverine® given intravenously had no effect. The sympathetic innervation was blocked by anesthetic administered high in the spine and the patient was prepared for operation.

After anesthesia, there seemed to be faint pulsations in the right common femoral artery. On exploration of the left common femoral artery it was found that there was no blood flow, nor could an embolus be dislodged from above. The wound was closed, and exploration of the aortic bifurcation was immediately begun. Adequate exposure was obtained through a long left transverse incision, with retroperitoneal approach.

Through the spastic walls of the vessels the embolus was palpated in the aorta and extending into both common iliacs. Soft rubber tourniquets were secured above and below the occlusion, with no attempt to mobilize the vessels; a 2 cm. incision was made in the aorta and the left iliac artery, and a gray-brown embolus was removed in two pieces by intraluminal pressure and gentle milking. A good flow of blood came from all arteries but the right common iliac.

The aortic wound was closed, Gelfoam® was applied, and the abdominal wound was closed. Immediately after operation the left foot and leg were red and hot, but the right foot and leg were cold and mottled. Palpation and oscillometric readings confirmed a diagnosis of occlusion of the bifurcation of the right common femoral artery, possibly dislodged during operation.

Sixteen hours later, after right sympathetic block had been carried out twice more, right femoral embolectomy was successfully accomplished, with immediate return of circulation to the right foot.

Convalescence: Circulation was observed clinically and by oscillometer, and sympathetic block was administered every 12 to 18 hours on one side or the other as indicated by the readings. By the fifth day, good bilateral posterior tibial pulses were palpable. Dicoumarol dosage was adjusted to findings on the quick prothrombin concentration test, which reached a level of 14 per cent of normal on the second day, were maintained below 20 per cent until the seventh day, and allowed to rise gradually thereafter. Alcohol in a 5 per cent solution and procaine in a 0.2 per cent solution were each administered intravenously three times in the first 48 hours, but this treatment was abandoned because greater vasodilatation occurred in uninvolved areas than in the lower extremities. However, it was apparently during the first administration of procaine that the cardiac rhythm reverted to normal.

The patient's bed was kept level and the lower extremities were kept cool. The wounds healed by first intention.

After detailed postoperative study, a cardiologist reported no evidence of organic heart disease.

Ambulation was first attempted on the seventh day; the patient was discharged on the thirteenth day and returned to work on the 45th day. Deep desquamation from the knees down occurred three times in the first four weeks. Severe foot pains occurred in the first six weeks but recovery was complete before the patient returned to work.

This case had several unique aspects. General conditions favored a successful outcome much more than in the average case. Despite heavy alcoholic intake, the patient's general health was good. The initial prothrombin concentration was low, and this condition may have prevented the development of long tail-clots so frequently encountered. The patient had no organic heart disease, and he was relatively young. Success in embolectomy may be measured not in terms of prolonged survival of the patient, because in most cases of embolism serious cardiac disease is also present, but rather in terms of preservation of tissue and of function. As far as can be ascertained, this is the thirteenth reported successful case of direct aortotomy for embolectomy of the aortic bifurcation and probably the most satisfactory in the end result, considering that the patient's lower extremities were apparently completely ischemic. It was felt that the secondary (right femoral) embolectomy was justified by the preservation of function and also of tissue.

Although paravertebral nerve block may result in severe hematomata when done in the face of reduced prothrombin concentration, it was felt that the paravertebral blocks were as necessary to recovery from vasospasm as was dicoumarol to the prevention of intravascular coagulation.

CONCLUSION

Occlusion of the terminal aorta by a saddle-riding embolus is a sudden and dangerous condition usually occurring in a patient already seriously ill with cardiac disease. However, it can occur in a person with functional or toxic cardiac arrhythmia whose general health is relatively good. In either event, prompt surgical intervention is indicated to prevent total disability or death. Even if the patient cannot tolerate surgical treatment, every other therapeutic measure of proven value should be attempted.

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Treatment of Impetigo with Sulfonamide-Urea Powder

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SUMMARY

Sulfonamides can be used in the treatment of impetigo with vastly increased safety and with more effectiveness in powder rather than ointment form when combined with urea powder in a ratio of approximately three parts of sulfonamide to one of urea.

Of 701 patients treated with such a mixture, 95.6 per cent were cured within a week. The only complication was local dermatitis which occurred in 0.57 per cent of patients. This compares favorably with results obtained with newer and expensive drugs which usually have the disadvantage of being used in a greasy vehicle.

The low incidence of sensitivity reaction to the sulfonamide-urea powder is perhaps ascribable in part to the avoidance of a greasy vehicle.

SULFONAMIDES combined with urea as a powder for topical use against impetigo are highly effective, safe, and simple to use. In addition, they are clean, cheap, and do not have the occlusive, heating, smearing effect of an ointment vehicle. The avoidance of such a vehicle may play some part in reducing the sensitizing tendency of the sulfa drugs.

CRITERIA FOR SATISFACTORY LOCAL APPLICATION

Sulzberger and Baer[12] pointed out that any new topical agent should be evaluated for therapeutic effect, for sensitizing capacity, and with regard to whether it may be used systemically. And, if it may be used systemically, it is important to know whether the sensitizing effect of previous topical use may foreclose use of the drug parenterally or enterally, perhaps as a life-saving measure, in treatment of a general illness. (This consideration may apply to practically all the newer antibiotics also. Yet, although there have been repeated warnings against the indiscriminate local application of sulfa drugs, some investigators who join in these admonitions do not hesitate to recommend the newer drugs for the same purpose, even though the degree to which they cause sensitization has not yet been determined.)

La Londe and Gardner[5] quoted studies in which it was noted that urea renders sulfonamide compounds more soluble and that it also has a solvent action on pus, debris and necrotic tisues which act as sulfonamide inhibitors. It also has the advantage of being relatively non-toxic, mildly bacteriostatic, and inexpensive. Organisms resistant to sulfonamides are no longer so when the drug is combined with urea. Some organisms which are not susceptible to either a sulfa drug or urea alone in vitro are destroyed by the two drugs together.

CLINICAL STUDY

The authors have used 70 per cent sulfathiazole and 30 per cent urea powder routinely in treatment for impetigo since 1943. Patients known to be sensitive to sulfonamides were not treated with this preparation. As sulfathiazole has been deleted from New and Non-Official Remedies,[9] sulfadiazine may be used instead. The former, in combination with urea, is a coarse grainy white powder; the latter mixture is finer.

The records of 1078 patients with impetigo who were treated in the office were reviewed. Seven hundred one patients were treated with the powder, and 670 of them (95.6 per cent) were well within a week. Local dermatitis developed in four patients (0.57 per cent); it cleared promptly when use of the powder was discontinued. Fifty-nine patients were treated with 5 per cent sulfathiazole ointment, of whom 44 (74.6 per cent) were well within a week. Dermatitis developed in three cases (5 per cent). Five per cent ammoniated mercury ointment was used in treatment of 268 patients, of whom 146 (54.4 per cent) were well within a week. Dermatitis developed in three cases (1.1 per cent). Various preparations—sometimes more than one in a single case—were used in treating 50 patients: 3 per cent Vioform® cream, half-strength Quinolor® compound ointment, penicillin ointment, bacitracin ointment, tyrothricin in Intraderm,® aureomycin ointment, or nitrofurazone ointment. None of the preparations was used in a sufficiently large group of patients to permit separate evaluation, but there were treatment failures with all except aureomycin and nitrofurazone, each used in only one case. Unfavorable reactions occurred in two of nine patients treated with penicillin ointment.

REACTIONS

Three of the four patients who had allergic reaction to the urea-sulfathiazole powder had not, so far as they knew, been previously exposed to sulfonamides. Two of them had local erythematous and weeping dermatitis within 48 hours after application of the powder, and the other had local dermatitis and scattered papulovesicles elsewhere over the body on the eleventh day of treatment. The

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patient who had had previous exposure to sulfonamides had used 5 per cent sulfathiazole ointment on one occasion and the urea-sulfathiazole powder on two occasions without trouble. In all four cases, cool wet dressings were applied and the dermatitis cleared within a week.

DISCUSSION

There is now more confusion as to the treatment of impetigo than there was 15 years ago. As recently as 1949, Rothman and Shapiro [11] believed that ammoniated mercury was the most commonly used agent. Miller and co-workers[7] noted that a variety of ointment preparations, bacitracin, sulfonamides, penicillin, dihydrostreptomycin, and nitrofurazone, were rapidly effective, but that sensitization rates varied. They reported that dihydrostreptomycin ointment caused reactions in 3.7 per cent of patients, which was a lower incidence than that associated with penicillin, the sulfonamides and nitrofurazone but significantly higher than that with bacitracin. Sulzberger and Baer[13] observed that aureomycin ointment, which has a relatively low sensitizing index (but higher than that of bacitracin or of the powder discussed herein) is a remarkably effective non-irritating form of therapy for the common varieties of pyoderma.

MacKenna and Cooper-Willis[6] in 1945 compared results of treatment of impetigo with microcrystalline sulfathiazole in 15 per cent suspension, with ordinary sulfathiazole in the same concentration, and with lotio cupro-zincica. The reported results, based on a statistical analysis of 1118 uncomplicated cases of contagious impetigo, suggested that, except for a sensitization rate of 2.5 per cent, treatment with sulfathiazole was superior.

Kile, Welsh and McAfee[4] used neomycin (derived from Streptomyces fradiae) in treating 200 patients, several of whom were known to be sensitive to penicillin, streptomycin, bacitracin and aureomycin applied topically. None of the patients had allergic reaction to the new drug, although several were sensitive to the ointment base.

Bacitracin ointment[1, 2, 3, 8] approximates penicillin, nitrofurazone and the sulfonamide drugs in effectiveness, but 0.5 per cent of patients are sensitive to it—a sensitivity rate approximately the same as that of the 70 per cent sulfathiazole-30 per cent urea powder. In addition, it is inactivated by hydrogen peroxide and potassium permanganate and is unstable in an alkaline medium. In contrast, the powder may be applied without debridement or preliminary wet dressings, although such procedures do not interfere with its effectiveness.

In the series here reported upon, the sulfathiazole-urea powder was the most rapidly effective drug, and the sensitivity rate compared favorably with that of the safest drugs now in use. One reason, perhaps, for the low incidence of reaction was the shortness of the period of treatment. There was only one instance of systemic reaction—toxic absorption dermatitis. There is a theoretical possibility of such a reaction from absorption of an appreciable amount of the drug from large denuded wounds, but in such a case the patient usually has fever or other symptoms of systemic disease, and would be best treated with an antibiotic systemically to prevent a major complication of coccal infection. There is also the remote possibility of bizarre hypersensitivity of the periarteritis nodosa type, as described by Rich,[10] but this remains theoretical with the use of the sulfonamide-urea powder as the authors advocate. A number of patients used the powder many times without having difficulties of any sort.

A minority of the patients in each of the groups treated by the various means received small exposures of superficial fractional x-ray therapy for diseases accompanying the impetigo, such as underlying eczema or dermatitis.

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Treatment of Nutritional Anemia in Infants

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SUMMARY

While iron deficiency is a common cause of anemia in infants, requiring specific treatment by administration of iron, there are other causes which require treatment equally specific. Anemia due to a nutritional deficiency can be improved only by providing the needed nutriment in sufficient quantity.

Two case reports are presented. One is of megaloblastic anemia in an infant, which was treated with a variety of vitamin preparations before administration of folic acid produced improvement. The other report is of anemia due to iron deficiency treated successfully with ferrous sulfate in a dosage twenty times that previously used prophylactically.

In prescribing an antianemic preparation the physician should assure himself that the dosage is adequate (for example, 0.5 gm. daily of ferrous sulfate for iron deficiency). "Broad-spectrum" preparations may be lacking in specific hematinics while containing a variety of vitamins which have no specific hematologic value.

IRON deficiency is probably the most common cause of anemia encountered in the practice of pediatrics. The etiologic delineation of this condition, the methods of diagnosis, and the means of effectual therapy with iron are well established.[5] It is also well established that anemia due to iron deficiency does not respond to any of the vitamins and other hematinics.[1, 5]

Megaloblastic anemia in infancy was characterized recently by Zuelzer and Ogden, who demonstrated that it responds specifically to folic acid[11] but does not respond to other vitamins and/or iron.

Vitamin B_{12},[6] discovered after Zuelzer and Ogden made their reports, has proved effective in megaloblastic anemia due to various causes,[7, 8, 9, 10] but it has also been reported that this substance has been tried without response in some cases in infants.[2] May and co-workers reported the effect of vitamin C deficiency in the pathogenesis of megaloblastic anemia experimentally induced in monkeys and noted that vitamin C has an important place in the successful therapy of the disease with vitamin B_{12}.[3]

During the development of these increasingly complex therapeutic discoveries there have appeared a variety of modified drop-form iron preparations, preparations with metallic adjuvants, and "broad-spectrum" hematinics. These are often recommended not only for correction of anemia, irrespective of the cause and nature of the disease, but also for general supplementation of an infant's diet. The purpose of this report is to reemphasize (1) the specific response of anemia when the patient is given adequate amounts of the substance in which he is deficient; (2) the lack of response to a "broad spectrum" of combined vitamins and hematinics in large doses if the required substance is not present in adequate amounts.

Case reports of two infants treated at Los Angeles Children's Hospital will be presented. These cases were selected because therapy prior to observation at the hospital was inadequate and because the lack of response illustrates what difficulties may result when a precise diagnosis is not established or where proprietary modified or nonspecific medications are relied upon.

The development of distinct reticulocytosis between 48 hours and ten days after administration of a hematinic is considered indicative of specific response to therapy. Such a response should be followed by a sustained rise in hemoglobin content of the blood or in the number of erythrocytes or both. Only in Case 2 was it possible to determine the latter development.

The diagnosis of megaloblastic anemia in Case 1 was established by the finding of typical megaloblasts on microscopic examination of stained smears of material aspirated from the bone marrow. In Case 2 the diagnosis of anemia due to iron deficiency was based on the microcytic hypochromic appearance of the erythrocytes and the finding of a very low hemoglobin content in the presence of an almost normal number of erythrocytes.

CASE REPORTS

CASE 1.—An 8½-month-old white female was admitted to Children's Hospital June 18, 1950 with complaint of severe coughing, vomiting, anorexia and diarrhea for the previous ten weeks. The patient had been normally delivered at term and had weighed 6 pounds and 10 ounces at birth. The parents and a 2½-year-old sibling had always been in good health; a grandmother had pernicious anemia.

At four weeks of age, because of hives, a proprietary modified powdered formula was substituted for the previous feeding of evaporated milk. Two weeks later another change was made, to pasteurized goat's milk; no further changes were made before or during hospitalization. Cereals, fruits and vegetables were accepted well from the fourth to the sixth month of life but subsequently refused. Vitamins A, D and C (ascorbic acid, 25 mg. per day) were given from the seventh month to the time of hospitalization. Except for the attack of hives at four weeks of age, the patient appeared to be developing normally to the age of six months, at which time she weighed 13 pounds.

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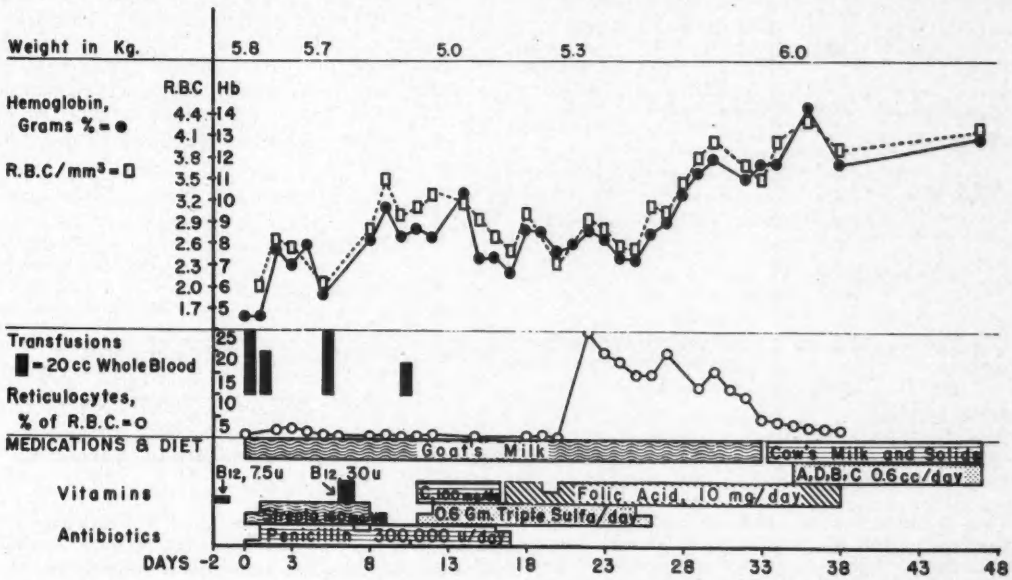
Chart 1.—Megaloblastic anemia of infancy; failure of response to vitamin B_{12} and vitamin C; subsequent improvement on administration of folic acid.



When the patient was brought to a physician because of coughing, vomiting, anorexia and diarrhea a diagnosis of pertussis was made although routine immunizations including a series of three antipertussis injections had been completed.

The illness did not respond to hyperimmune pertussis serum and after two months of continued coughing, a two-day course of aureomycin was administered without improvement. In the next two weeks increasing pallor became noticeable and some swelling of the extremities developed. Two days before hospitalization two intramuscular injections of Vitamin B_1 and one intramuscular injection of 7.5 micrograms of Vitamin B_{12} were administered. There was no improvement in the infant's condition, and two days later she was admitted to Children's Hospital.

On physical examination the infant was observed to be waxen pale and acutely and chronically ill, with grunting respirations and a rectal temperature of 99.2° F. The tympanic membranes in both ears were bulging and there was discharge of caseous material from the left ear. The liver edge was palpable 2 cm. below the right costal margin; the spleen was not palpable. There was edema of the feet, but no other physical or neurological abnormalities were noted.

On the day of admission erythrocytes numbered 910,000 per cu. mm. of blood and the hemoglobin content in the blood was 4.8 gm. per 100 cc. Sixty cubic centimeters of whole blood was administered immediately. Except for the presence of megaloblasts in a ratio of 6.2 per cent, the bone marrow appeared normal.

On the following day the leukocytes numbered 19,600 per cu. mm., of which granulocytes were 43 per cent, lymphocytes 54 per cent, monocytes 2 per cent, and reticulocytes 0.8 per cent; the platelets appeared to be normal. The non-protein nitrogen content of the blood was 35 mg. per 100 cc.; proteins in the plasma amounted to 4.16 gm. of albumin and 1.11 gm. of globulin per 100 cc. On gastric analysis on the eighteenth day after admission, free hydrochloride was not found and total acidity was estimated at 9.60 units or 0.035 per cent. Results of a tuberculin test and of urinalysis were normal. No abnormality was observed in roentgenograms of the chest and long bones.

Chart 1 summarizes the course and treatment of the illness during the subsequent 45 days the patient was under observation. During the first six days of hospitalization blood transfusions, penicillin and streptomycin were administered until the hemoglobin content became stabilized at 8 gm. per 100 cc. and the otitis media subsided. The only food given was goat's milk obtained from the same source as that used before hospitalization; no vitamins were added.

On examination of aspirate from the bone marrow on the sixth hospital day, megaloblasts were observed to have increased to 27 per cent; on that day, therefore, 30 micrograms of vitamin B_{12} was injected intramuscularly. No change in the megaloblastic pattern was observed in examination of bone marrow aspirate taken on the tenth and twelfth hospital days.

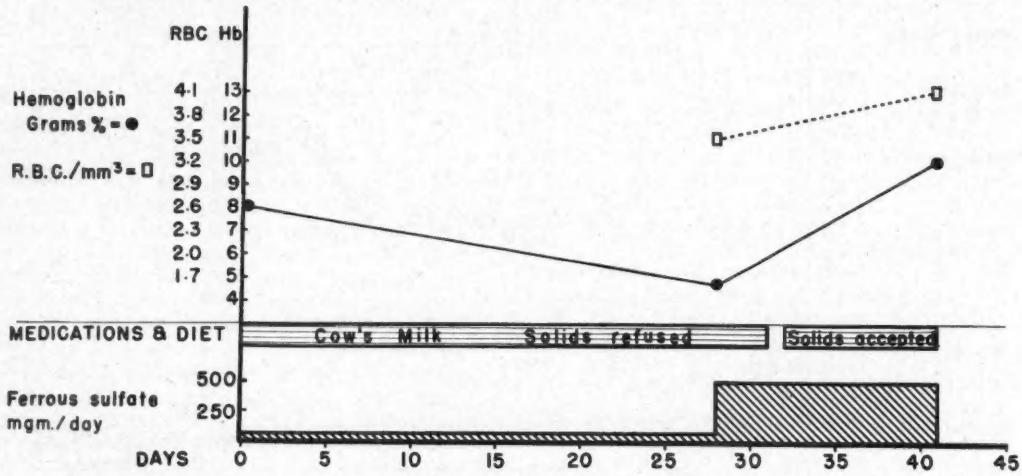
On the twelfth day 100 mg. of vitamin C was administered parenterally, and this therapy was continued for six additional days, after which, in the fifth specimen aspirated from the bone marrow, the proportion of megaloblasts was found to be 23 per cent. By this time the infant's general condition, which had been poor on entry, had further deteriorated; she became extremely apathetic and listless. The goat's milk formula had to be given by gavage; she continued to lose weight, and aspiration of bone marrow for further observation had to be discontinued because of the poor condition of the patient.

Thereupon, folic acid was administered orally in daily doses of 10 mg.;* there followed a sustained reticulocytosis and regeneration of blood (Chart 1). The infant gained weight and her general condition improved without further addition to the diet.

During the course of therapy numerous cultures were made of the stools to ascertain the nature of the flora in the gastrointestinal tract. On all cultures colonies of Escherichia coli and Bacillus aerogenes were too numerous to count, and a few colonies of the para colon group were present; but no pathogenic agents were noted.

*No conclusion has been reached regarding the minimal effective dosage of folic acid for this condition; but response has been as good on a daily dosage of 5 mg. as on larger doses.

Chart 2.—Anemia due to iron deficiency in an eight-month-old infant; failure of response to inadequate amounts of iron; subsequent improvement with adequate dosage.



CASE 2.—An eight-month-old female was brought to the hematology research laboratory in September 1950. She had been well until mild upper respiratory infection developed four weeks previously. The physician who treated the patient at that time noted slight pallor, and upon examination of the blood it was noted that the hemoglobin content was 7.5 gm. per 100 cc. The physician prescribed a proprietary medicine containing ferrous sulfate. The preparation was given in the amount recommended on the label as the prophylactic dose—ten drops per day (added to one of the milk feedings) which supplied approximately 10 mg. of iron in 25 mg. of ferrous sulfate. Twenty-seven days later the hemoglobin content was 5.6 gm. per 100 cc., and the patient was referred to the laboratory.

Pallor was the only abnormality observed on physical examination. The characteristic hypochromasia and microcytosis of anemia due to iron deficiency were observed in the blood. There were 3,480,000 erythrocytes per cu. mm. and the hemoglobin content was 4.9 gm. per 100 cc. The leukocytes and platelets were normal in number and appearance. A diagnosis of anemia due to iron deficiency was made.

The dosage of ferrous sulfate was increased twenty-fold, to 500 mg. per day;* no other change was instituted in the care of the infant. During the following thirteen days the general condition of the patient improved remarkably and she regained her appetite for foods in addition to milk. The clinical course is illustrated in Chart 2.

Several cases similar to Case 2 are encountered each year at the Los Angeles Children's Hospital. Nevertheless, pediatricians are frequently offered some new iron preparation for which the claim is made that it is more effective than those previously used, the implication being that the new preparation can be employed in a reduced dose. In some instances, the labeling of the package does not make it clear whether the recommended dose is for therapeutic or prophylactic purpose.

For treatment of anemia due to iron deficiency in infants, the minimum dose of ferrous sulfate is 0.3 gm. daily, regardless of the age of the infant or the severity of the anemia. The most effectual method of administration has been stated recently by McLean: "This salt is best given in liquid form as a syrup or elixir on an empty stomach. It can be given alone, with plain water or with fruit juices. There is no evidence to justify the addition of adjuvant substances to the iron in iron deficiency anemia."[4]

*The therapeutic daily dose of ferrous sulfate for the treatment of anemia due to iron deficiency has been stated by numerous investigators[1,5] to be 400 to 600 mg. per day.

DISCUSSION

Pediatricians are called upon to treat mild or moderate pallor and anemia in infants over four months of age in many cases in which it is impractical to undertake an exhaustive hematologic analysis of the condition. The physician may prescribe a therapeutic mixture which compensates for the commoner nutritional deficiencies leading to anemia. If he does so, he should recognize that anemia of the kind which characteristically develops in premature infants during the first three months of life is not remedied by administration of iron and/or folic acid, and that if there is no distinct hematic response to adequate dosage within two weeks another cause for the anemia must be suspected and careful hematologic studies made. In most cases, however, the cause of anemia in infants is lack of iron due to nutritional deficiency; but the possibility of loss of blood must be remembered, and inquiry should be made regarding signs of gastrointestinal bleeding.

The two cases presented illustrate three common errors in the treatment of anemia in infants: (1) An insufficient quantity of iron is prescribed for anemia due to iron deficiency; (2) remedies for pernicious anemia other than folic acid are prescribed to treat possible megaloblastic anemia; (3) other vitamins such as A, B, C and D, important in infant nutrition but of no specific hematologic value, are prescribed while the specific hematinics are ignored.

CONCLUSION

The ideal "broad-spectrum hematinic" for oral therapy in common cases of nutritional anemia in infants should provide 0.5 gm. of ferrous sulfate and approximately 5 mg. of folic acid per day. Other vitamins add to the expense of therapy but do not contribute to the specific hematologic action.

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Encephalitis in Kern County, California, 1941-1950

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SUMMARY

Encephalitis is a challenging public health problem in Kern County and in the San Joaquin Valley area.

During the last ten years the authors have studied the epidemiology of encephalitides due to arthropod-borne viruses and the methods used in the differential dignosis of these conditions. To incriminate a virus it is necessary to demonstrate a rise in antibody titer in the blood over a period of seven to fourteen days, the first specimen to be taken as soon as possible after onset of symptoms. A variety of tests may be necessary in some cases.

Among the patients included in this presentation the greater number of those with encephalitis and also of those with poliomyelitis were under 30 years of age. The age range was five weeks to 49 years. The median annual mortality rate was 4.3 deaths per 100 cases for poliomyelitis and 3.9 for encephalitis. The greatest incidence occurred during the summer months.

The clinical manifestations usually observed in encephalitis are described, but it is emphasized that wide variations and even completely atypical clinical phenomena are encountered. Four representative cases are reported and treatment is discussed.

Vaccination and vector control are considered as the most promising means of combating the disease.

DURING the last ten-year period, encephalitis* has occurred in epidemic, sporadic outbreaks and with endemic regularity in Kern County.

From 1941 to 1950, inclusive, 368 cases of encephalitis were diagnosed and reported as caused by a specific virus, either the western equine or the St. Louis strain, or of undetermined cause yet clinically of a pattern similar to that of western equine or St. Louis encephalomyelitis. The greatest number of cases of encephalitis reported in any one year during the ten-year period was 105, in 1945; the smallest number was six, in 1941. In the previous decade, 1931 to 1940 inclusive, 90 cases of encephalitis were reported.

Incomplete studies of this 20-year period indicate that the increase in number of reported cases may be attributed at least in part to improved diagnosis and reporting; but because of the high mortality rate, the difficulty of differential diagnosis, and the existence of unidentified pathogenic viral agents, encephalitis continues to be a challenging public health problem in Kern and other San Joaquin Valley counties.

In 1930, Meyer, Haring and Howitt[9] first isolated a virus from the brain tissue of infected horses in California. As early as 1932, Meyer suspected the occurrence of equine encephalomyelitis in humans when the disease was reported in three men working with horses known to have had the disease. No virus, however, was recovered at that time.

In 1938, Fothergill[3] and co-workers reported obtaining the eastern strain of the equine virus from human cases in Massachusetts, while in the same year the relationship of the western strain to man was first established by Howitt[5] in California. Howitt introduced the statewide use of blood serum neutralization tests in 1939; and, with the aid of other diagnostic information from various sources, a different viewpoint was developed in the San Joaquin Valley areas concerning neurotropic virus diseases. Meyer was one of the first experimental workers to suggest that cases of mild encephalitis might be inaccurately reported as non-paralytic poliomyelitis or be missed entirely.

In the last ten-year period in the Kern County Health Department and the Kern General Hospital, the authors have been primarily interested in epidemiologic and diagnostic studies of the encephalitides caused by the arthropod-borne viral agents and all other viral, viral-like or bacterial infections which might be difficult to differentiate clinically.

During this time, the western equine virus was obtained from the brain tissue of patients in two instances. The strain of the western equine virus isolated in California in 1938 was used throughout the virus studies in Kern County cases, while the St. Louis virus was one originally sent by Dr. L. T. Webster of the Rockefeller Institute. Whenever material could be obtained, 10 per cent suspensions of brain or spinal cord material obtained at autopsy were inoculated into mice, guinea pigs and a monkey. Upon recovery of a virus from one or all of these animals, further serological and immunological tests were made to determine the type.

In one three-year period 316 patients were carefully examined for neurotropic virus disease at Kern General Hospital—71 patients in 1938, 160 in 1939

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* In this presentation, "encephalitis" refers primarily to those neutrotropic diseases caused by viruses borne by specific arthropods.

and 85 in 1940.[1] Of this number, 116 were segregated as having St. Louis or western equine encephalitis on the basis of clinical and laboratory data including several blood serum neutralization tests. This three-year study formed the background for future study of encephalitis.

During the ten-year period 1941 to 1950, hundreds of serological tests of blood from humans, animals and birds in Kern County known to have or suspected of having encephalitis and poliomyelitis, and of blood from normal persons, were carried out. The technique for performing each of the commonly used neutralization tests was described by Hammon[4] in "Diagnostic Procedures for Virus and Rickettsial Diseases" in 1948, and the significance, applicability, limitations and interpretations were described by Sather and Hammon.

In early studies of encephalitis it was found that in order to incriminate a virus as the cause of the infection it was necessary to demonstrate a rise in antibody titer between two serum specimens taken at 7- to 14-day intervals, the first specimen to be obtained at the earliest possible moment after the onset of symptoms. In western equine encephalitis, neutralizing antibodies may have begun to develop at the first recognizable signs of illness and the highest titer may be reached by the end of the first week, whereas St. Louis encephalitis antibodies rise much more slowly and may not attain a significant level for several weeks. There is never any overlapping of the time patterns of antibody response in these two diseases. However, some overlapping of response time as between the St. Louis virus and organisms of the Japanese B-West Nile group has been reported. In western equine encephalitis the complement fixation antibody is occasionally slow to appear, and some variation of the neutralization test usually gives a more clear-cut rise in titer than does the complement fixation test. Use of both types of test on a specimen, although causing a discouraging delay in reporting, gives more reliable information.

EPIDEMIOLOGY

In the early days much emphasis was placed on inapparent infections when studying clinical cases of this disease. Perhaps too much stress was placed upon rural environmental and occupational hazards. Ultimately these factors proved significant but not stable. The pattern of incidence of cases in successive years indicated focalized rural distribution. In the farming districts where the horse population was greater, more of the human cases occurred; however, close correlation between horse and human infections could not be shown uniformly. There were 187 reported cases of encephalitis in horses in Kern County in the ten-year period 1941 to 1950, inclusive. The diagnosis, made by Kern County veterinarians, was based upon clinical evaluation and, in most cases, upon results of blood neutralization tests.

During the ten-year period 1941-1950, there were 368 cases of infectious encephalitis and other suspicious conditions reported to the Kern County Health Department for field work and follow-up studies. A greater number of cases occurred in persons under 30 years of age and in males. During this period, the youngest patient was five weeks of age (reported for 1949); the oldest was 71 years of age (reported for 1950).

Similar data on poliomyelitis for the same period show approximately the same pattern. There were 670 cases of poliomyelitis reported during this time, a greater number in persons under 30 years of age and in males. The youngest patient was five weeks of age (reported for 1948), and the oldest was 49 years of age (reported for 1941). From these data it may be assumed that both diseases are more characteristic of the younger age groups. An example of distribution by age and sex of encephalitis as compared with poliomyelitis is shown for the period 1948 to 1950 in Table 1. Complete data for this age and sex distribution were not available for the ten-year period being studied.

The greatest number of poliomyelitis cases reported in any one year during the ten-year period was 234 in 1948; the least number was 7 cases in 1942.

Table 2 shows the number of deaths per 100 cases due to poliomyelitis and encephalitis for Kern County during the ten-year period 1941-1950. The highest annual mortality rate reported for poliomyelitis was 13 per cent in 1943; that for encephalitis was 14.3 per cent in 1942. The median annual mortality rate* was 4.3 per 100 cases for poliomyelitis and 3.9 per 100 for encephalitis.

There was a definite seasonal variation in the incidence of these diseases during the ten-year period, with the greatest incidence occurring during the months of July, August and September.

Geographical concentration of cases also was noted. Of 1,498 cases of encephalitis reported in the state of California during this ten-year period, 958

* The median rate was derived by arranging mortality rates for the ten-year period according to magnitude and computing the arithmetical mean of the two middle rates.

TABLE 1.—*Reported Cases of Encephalitis and Poliomyelitis by Sex and Age Groups—Kern County, 1948-1950*

Year	Disease	Sex				Total No. Cases	Under 1 Year		1 to 9 Years		10 to 19 Years		20 Years and Over	
		Male		Female										
		No.	Per Cent	No.	Per Cent		No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
1948	Encephalitis	12	54.5	10	45.5	22	3	13.6	9	40.9	6	27.3	4	18.2
	Poliomyelitis	129	55.1	105	44.8	234	8	0.3	144	61.5	46	19.6	36	15.3
1949	Encephalitis	20	76.9	6	23.1	26	1	3.8	8	30.8	6	23.1	11	42.3
	Poliomyelitis	42	56.0	33	44.0	75	4	5.3	49	65.3	12	16.0	10	13.3
1950	Encephalitis	45	60.8	29	39.2	74	7	9.4	24	32.4	6	8.1	37	50.0
	Poliomyelitis	15	40.5	22	59.5	37	0		20	54.1	8	21.6	9	24.3

TABLE 2.—*Mortality Rates from Encephalitis and Poliomyelitis—Kern County, 1941-1950*

Year	Deaths Per 100 Cases	
	Encephalitis	Poliomyelitis
1941	0	0
1942	4.0	14.3
1943	13.0	4.8
1944	12.5	0
1945	2.8	10.5
1946	3.8	3.8
1947	5.6	11.1
1948	0	6.4
1949	3.8	0
1950	4.0	2.7

(64 per cent) were in the San Joaquin Valley (Kern, Tulare, Kings, Fresno, Madera, Merced, Stanislaus and San Joaquin counties), and 364 cases (24.3 per cent) in Kern County alone. Kern County had the largest percentage of cases (38 per cent) in the San Joaquin Valley. Fresno County was next (23.7 per cent). (Fresno and Kern counties have the largest area and the greater population of the eight counties in the valley area.) As to geographical distribution of cases of poliomyelitis and encephalitis in Kern County for one specific year (1950), the largest concentration was in the more populous towns (Bakersfield, Delano, Shafter and Wasco). It is noteworthy that only one case of encephalitis and two cases of poliomyelitis occurred in the eastern desert area of the county during 1950.

The 74 cases of encephalitis reported in Kern County in 1950 included nine diagnosed and confirmed as western equine, 26 diagnosed as of the St. Louis type and 39 cases of clinical encephalitis in which the specific causative agent was not determined. In addition there were 17 cases diagnosed as mumps encephalitis, but these were not included in the 74 cases mentioned above. Mumps encephalitis was not diagnosed or reported unless there was demonstrated a definite rise in complement fixation antibody titer in two successive serologic studies, with the first specimen taken as near to the time of onset as possible and the second at the end of the first or second week.

Of special interest is the observation that of 17 patients with proven cases of mumps encephalitis diagnosed in 1950, only eight had clinical manifestation of parotitis at any time. This emphasizes the difficulty of differentiating mumps encephalitis if it should occur simultaneously with arthropod-borne encephalitis.

CLINICAL PICTURE AND DIFFERENTIAL DIAGNOSIS

The clinical picture of encephalitis follows a characteristic pattern in most instances. After an incubation period of from five to twelve days, symptoms of malaise, headache and gastrointestinal disturbances are noted. Early symptoms are followed within 24 to 48 hours by fever, vomiting, tremor, twitching, ataxia, convulsive seizures, diplopia and sometimes paralysis. The fulminating epidemic disease is sometimes fatal within the first few days of illness. In the authors' series, all but a few of the patients made complete recovery.

As a rule, the acute manifestations last about one week, extremes being one to three weeks. Cyanosis, irritability, tremor and muscle twitching and residual spastic paralysis occur in many cases. Many of the fatal cases cause extremely high temperatures and convulsive seizures. In many cases the leukocyte count is elevated to 12,000 to 16,000 per cu. mm.

The spinal fluid of most patients has a ground glass appearance; the globulin content is increased to 4 plus; the pressure is slightly higher than normal, and the number of leukocytes and the proportion of polymorphonuclear cells vary considerably. In a series of cases in a three-year period, the proportion of polymorphonuclear cells ranged from 52 per cent to 78.5 per cent.

Many exceptions and wide variations occur in the manifestations of encephalitis, and in some cases the clinical features are entirely atypical. In differential diagnostic studies over the ten-year period covered by this report, it was noted particularly that at one time during the clinical illness in each case the identification of the encephalitic factor was problematical. Cases in 1950, a year in which clinical and epidemiologic records were most complete, were classified into three major groups as indicated below.

In Group I (purulent meningitis) there were 45 cases. The summary of diagnoses in this group included 12 of meningococcal meningitis, nine of influenzal meningitis, two of pneumococcal meningitis, one of staphylococcic meningitis, one of pertussis meningitis and 20 in which the causative factor was not determined.

In Group II (granulomatous meningitides) there were 25 cases, which included 13 cases of tuberculous meningitis, 5 cases of luetic meningitis, and 7 cases of coccidioidal meningitis.

In Group III (viral encephalitides) there were 130 cases, including 25 cases of St. Louis encephalitis, 9 of western equine encephalitis, 40 of encephalitis of undetermined origin, 36 of poliomyelitis, 1 of postvaccinal encephalitis (following rabies immunization), 2 of chickenpox encephalitis and 17 of proven mumps encephalitis.

In addition to these three groups, there were 12 cases in which clinical symptoms and results of laboratory studies indicated encephalitis but the encephalitic factor was not diagnosed.

The following four case reports, three of them on cases of arthropod-borne encephalitis and one on a case of mumps encephalitis, are presented as typical.

CASE REPORTS

CASE 1.—A white male, aged 15 months, became ill Aug. 18, 1950, and was admitted to the Kern General Hospital. Symptoms reported by the patient's mother were irritability, stiffness of the neck, convulsions, and temperature of 104.6° F. On examination, neck stiffness, scattered rales throughout the chest, hyperactive reflexes and general irritability were noted. A preliminary diagnosis of possible encephalitis was made.

On x-ray examination August 23 the chest appeared normal. The urine, examined the following day, was normal. The hemoglobin value in the blood was 75 per cent. Erythrocytes numbered 3,850,000 per cu. mm., and leukocytes 17,000—33 per cent lymphocytes, 5 per cent monocytes, 5

per cent stab cells and 57 per cent segmented cells. Mantoux and coccidioidin skin tests made Aug. 28 showed no abnormality. When the spine was tapped Aug. 31, no increase in pressure was noted. The fluid was slightly cloudy and contained 337 cells per cu. mm.—10 per cent polymorphonuclear and 90 per cent lymphocytes. The total protein content was 35 mg. per 100 cc. and the sugar content was normal.

The patient received routine care including administration of penicillin and symptomatic treatment. Clinical recovery was uneventful and the patient was discharged Sept. 18, 1950. The cell content of the spinal fluid on that day was 22 per cu. mm.—all lymphocytes. The final diagnosis was St. Louis encephalitis.

A field follow-up to inspect the patient's home environment was made by a public health nurse, a sanitarian, and a mosquito abatement inspector. Although an unusually high number of mosquitoes was noted in the neighborhood, neither the mother nor the physicians who examined the patient found any physical evidence of mosquito bites or any significant, pertinent relationship of the presence of mosquitoes to the illness.

In tests of blood samples submitted to the State Public Health Virus Laboratory on Aug. 25 and Sept. 18, positive complement fixation antibody titer for St. Louis encephalitis in dilution of 1:128 was noted. The patient was examined twice in the pediatric clinic of the Kern General Hospital (on Sept. 18 and Oct. 23, 1950) and subsequently made complete and satisfactory recovery.

* * *

CASE 2.—A white male, 35 years of age, became ill on Aug. 29, 1950, and was admitted to Kern General Hospital on Sept. 1. Symptoms upon admission were stiffness of the neck, semi-coma, irritability, headache, high temperature and hyperactive reflexes with some spasticity. The preliminary diagnosis was encephalitis.

In a spinal fluid examination made outside the hospital on Aug. 30 the sugar content had been estimated at 65 mg. per 100 cc. and the total proteins at 36 mg. per 100 cc.; there were 79 cells per cu. mm.—2 per cent polymorphonuclear and 98 per cent lymphocytes. On Sept. 1 there was a slight increase in spinal fluid pressure. The fluid was slightly cloudy; the sugar content was 78 mg. and the total protein content 87 mg. per 100 cc.

On urinalysis Sept. 3, albumin content was found to be 2 plus and sugar content 2 plus; there were a few granular and hyaline casts.

The hemoglobin value in the blood on the same day was 85 per cent, and leukocytes numbered 5,700 per cu. mm.—20 per cent lymphocytes, 6 per cent monocytes, 1 per cent basophils, 7 per cent stab cells and 66 per cent segmented cells.

On Sept. 5 there were 216 leukocytes per cu. mm. in the spinal fluid, and reaction to a Pandy test was positive.

Blood specimens were submitted to the State Laboratory of Public Health Department on Sept. 2 and Sept. 6 and a positive complement fixation antibody titer for St. Louis encephalitis was demonstrated. St. Louis encephalitis was the final diagnosis.

Great numbers of mosquitoes in the patient's home neighborhood were reported by public health nurses and sanitarians. The patient lived close to a race track; however, no illness was known to have occurred in the horses.

Despite treatment, the condition of the patient became steadily worse. After 48 hours in a more or less comatose state, the patient died on Sept. 16.

* * *

CASE 3.—A white male 37 year of age was admitted to Kern General Hospital Aug. 27, 1950, with stiffness of the neck, headache, irritability, hyperactive reflexes, nausea and high temperature. The result of a coccidioidin skin test was 3 plus and of a Mantoux skin test 2 plus. A previous coccidioidin skin test had given a negative result. The tentative diagnosis was encephalitis.

Spinal fluid examined the same day contained 33 leukocytes per cu. mm.—32 per cent were polymorphonuclear cells and 68 per cent lymphocytes. The total protein content was 67 mg. per 100 cc. The hemoglobin value in the blood was 91 per cent; there were 7,100 leukocytes per cu. mm.—29 per cent lymphocytes, 3 per cent monocytes, 1 per cent eosinophils and 67 per cent segmented forms. No virus was demonstrated in a specimen of blood taken that day or in another taken Sept. 6.

The specific gravity of the urine was 1.017. There were 10 to 12 leukocytes per high dry field. No albumin or sugar was noted.

Spinal fluid examined Aug. 31 contained 19 leukocytes per cu. mm.—all lymphocytes.

The final diagnosis of western equine encephalitis was based on rise in titer of specific antibodies in the blood in a test made Nov. 17. The patient recovered completely.

* * *

CASE 4.—A 12-year-old white male became ill Feb. 15, 1950, with high temperature and stiffness of the neck but no evidence of parotitis.

Occasional erythrocytes and leukocytes were noted in the urine on Feb. 17. No albumin or sugar was present. The spinal fluid contained 680 leukocytes per cu. mm.—some polymorphonuclear, 80 per cent lymphocytes; the sugar content was 62 mg. per 100 cc., and the total protein was 41 mg. per 100 cc.; response to a Pandy test was negative. The hemoglobin value in the blood was 89 per cent; there were 8,400 leukocytes per cu. mm.—37 per cent lymphocytes, 3 per cent eosinophils, 6 per cent stab cells, 54 per cent segmented cells; the sedimentation rate was 4 mm. in on hour, and packed red cells were 40 per cent of the whole blood.

On Feb. 20 the specific gravity of the urine was 1.008 and it contained no albumin or sugar. The spinal fluid on Feb. 21 contained 1,350 leukocytes per cu. mm.—40 per cent polymorphonuclear cells, 60 per cent lymphocytes. No pathogenic organisms were noted in examination of smears of the spinal fluid and none grew on cultures. The sugar content was 35 mg. per 100 cc. and the total protein content was 90 mg. per 100 cc.

The patient was kept at rest in bed and treated with hot packs. Penicillin was administered.

The California Virus Laboratory reported that in tests on a specimen of blood submitted Feb. 17 the presence of mumps virus was noted. Results of tests were negative for the viruses of western equine or St. Louis encephalitis.

The patient recovered. On March 9 the spinal fluid contained 52 leukocytes per cu. mm.—4 per cent polymorphonuclear cells, 96 per cent lymphocytes; the sugar content was 62 mg. per 100 cc. and the total protein content was 41 mg. per 100 cc.

Since the clinical symptoms were not distinctive, the diagnosis could not have been made without the demonstration by titration of mumps antibody and the abnormalities in the spinal fluid.

TREATMENT AND CONTROL

In the ten-year series of cases here presented, active treatment during the acute and following stages of encephalitis was entirely nonspecific. During the acute phases treatment was directed chiefly to the relief of acute neurogenic symptoms. In many cases the muscles were spastic. Hot packs and modi-

fied Kenny treatment were used with good effect in the relief of severe muscle tension.

Rivers[10] came to the conclusion that the treatment with immune sera is, with few exceptions, valueless if it is begun after onset of definite clinical symptoms of viral infection. Sulfonamide compounds do not affect the virus or, in animal experiments, the disease induced by it. The use of these drugs proved of no value in the cases observed by the authors. All of the other antibiotics were used but none altered the clinical course of the viral disease.

Since no specific treatment for encephalitis is known, emphasis on control measures seems indicated. Formolized chick embryo vaccine is used routinely by Kern County veterinarians to prevent the disease, primarily in equine animals. It has obtained the approval of the U. S. Bureau of Animal Industry as an effective means of prophylaxis. Recommendations concerning the use of such a vaccine in man must await the outcome of controlled tests in the field under epidemic conditions. Nevertheless, in the interim, it is being used for workers in laboratories and for persons especially exposed to the virus. For passive immunization, a specific antiserum has been used successfully in experimental animals, but no adequate trial has been made in humans.

Since arthropods, especially mosquitoes, are considered to be the common vectors, the Kern County Mosquito Abatement District has taken thorough measures to eradicate these insects.

Not all species of animals and birds which harbor the viruses of encephalitis have been so identified; besides man and the equine animals, certain species of wild birds and domestic fowl are known to be hosts. Among the vectors which have been and should be the object of control measures are wild bird and chicken mites, wood ticks, cone-nosed kissing bugs and any suspicious blood-sucking insects in areas where encephalitis is endemic.

ACKNOWLEDGMENTS

The authors wish to express their thanks to Dr. Myrnie A. Gifford, assistant health officer of the Kern County Health Department, to Dr. Robert Cohen of the Kern General Hospital staff, and to Ida Mae Stevens of the California State Department of Public Health for their assistance in the preparation of this report. The laboratory work was done by the George W. Hooper Foundation of the University of California and by the State Department of Public Health. The epidemiological techniques were jointly evolved by the Hooper Foundation, State Department of Public Health, Kern County Health Department, and staff members of the Kern General Hospital.

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EDITORIAL

Culmination

Within another month Doctor John W. Cline of San Francisco will turn over the presidency of the American Medical Association to his succesor. At that time he will be relieved of the many burdensome duties which have accompanied his two years as president-elect and then president of the world's largest medical organization.

As the time approaches for another A.M.A. chief to take office, a review of Doctor Cline's activities is indicated, both for the lesson available to others and for the moral to be learned from a man who knew where he was going, how to get there and how to bring others along with him.

John Cline entered the official ranks of the American Medical Association only seven years ago, when he first became a Delegate from California. In his first few sessions of the A.M.A. House of Delegates he encountered opposition, if not downright antagonism, to many of the subjects he broached in behalf of his fellow physicians in his home state. The California delegation in the A.M.A. had not enjoyed too high a respect from some other sections of the country and when Doctor Cline and his fellow delegates came along with such unmentionable ideas as revising the top management force of the parent organization, they did little to increase their own popularity.

Perseverance, however, began to bear fruit as more and more members of the House of Delegates came to listen more attentively to the logic, the reason and the forcefulness of the proposals made by the Californians. Doctor Cline was in the forefront of this campaign, ever ready to speak with his well-ordered vigor, always willing to listen to the other fellow and to compose differences which did not conflict with the principles he and his associates held to be vital for the good of American medicine.

As the California ideas came to be more favorably accepted in the A.M.A. House of Delegates, other changes took place. Some shifts in personnel, both at the policy-making and at the administrative level, brought forth a stronger organization, one more fully equipped to deal with the problems of the times. Doctor Cline remained at the head of this transformation, urging the positive and aggressive steps needed to create a better A.M.A. His exceptional ability to speak, undoubtedly stemming from his pre-medical debating team days, and his self-evident leadership, again going back to his collegiate experiences, stood him in excellent stead.

Doctor Cline has an ability to sway an audience which is not granted to many men. He is possessed of the innate capacity to grasp a situation, translate it into coherent and understandable terms and transmit it to those working with him. This faculty, from a standing start, impressed itself so indelibly on the minds of the delegates in the A.M.A. that, without waiting for John Cline to go through subordinate offices, they unanimously elected him in 1950 as president-elect of the American Medical Association.

Once in that position, Doctor Cline continued to use well his administrative and persuasive talents. Without stint, without regard to the amount of time demanded of him, he set forth to carry the story of the new A.M.A. to the country. Speaking engagements flooded in on him and, to his credit, he accepted them wherever it was humanly possible to do so. His travels in the past two years have taken him to Europe, to the islands of the Pacific, to military installations all over the country and in Europe, to lay audiences in public meetings and on radio programs, to debates, to forum sessions and, more important, to medical audiences in practically every state in the country.

In all of these places Doctor Cline has followed out his original theme of the good in American medicine, of the positive approach to matters of

public interest, of the development of voluntary prepaid health insurance, of the strides made by medicine in an atmosphere of freedom and professional integrity. Certainly it does not in the least discredit the abilities of other advocates in the same field to say that undoubtedly John Cline has been the foremost proponent, the most effective, in carrying this story to the American people.

An example of his unstinting devotion to this duty can be gained from a review of just one of his travel itineraries last year. In a period of five weeks he went from San Francisco to Denver, Kansas City, St. Louis, Louisville, Memphis, Atlanta, Miami, Washington, Wilmington, New York, Portland, San Francisco, New York, New Haven, New York, San Francisco, Reno, Los Angeles, St. Louis, Pittsburgh, Chicago, Grand Rapids, Chicago, Denver, Rock Springs, Wyoming and thence back to San Francisco.

In carrying out other itineraries of comparable scope, and in spending more than two-thirds of his time away from his own professional office, John Cline has racked up a new record high mileage in the history of United Air Lines. By the close of his term of office in the A.M.A. he will have traveled more miles in one year than any other passenger in United's history. Next month he will have completed more than 125,000 miles of air travel in one year.

Next month John Cline will lay down his reins in the A.M.A. We know he will still be called upon by that body to lend his talents for the good of medicine, but he will be relieved of his multitudinous and arduous duties as the top elective officer. We will welcome him back to California, his birthplace and his home. We will welcome back in our own ranks his counsel, his capacity and his courage in his convictions. California will gain by his return.

California is proud of having contributed John Cline as a president of the American Medical Association, especially in the trying period in which he has served. For the good of medicine we hope that future A.M.A. presidents will reach and, if they can, surpass the mark that he has left during his tenure. The goal is high but the accomplishments great.

Letters to the Editor . . .

Emotional Hyperacidity

It is currently assumed that the only ways in which the stomach can be stimulated to secrete pepsin and hydrochloric acid are mediated: (a) by way of the vagus nerve, or (b) by direct action of the locally produced hormone, gastrin. Gray[1] and associates of the Peter Bent Brigham Hospital, Boston, Mass., report clinical evidence that there is a third regulating mechanism mediated through the pituitary gland. This evidence was drawn from a quantitative study of the effects of ACTH upon gastric secretion.

The basal gastric secretion was first measured in seven patients with essentially normal stomachs by inserting a Levine tube into the stomach in the morning, following a 10- to 12-hour overnight period of fasting. The stomach was then aspirated for a period of 60 to 90 minutes. The first 15-minute specimen was discarded and then three to five consecutive 15-minute aspirations were obtained by constant suction.

They found that the continuous daily administration of 100 to 160 mg. ACTH resulted in a 241 per cent increase in the basal secretion of hydrochloric acid and a 182 per cent increase in pepsin. A 194 per cent increase in uropepsin excretion was also noted, parallel to the rise in gastric juice pepsin. After discontinuation of ACTH administration, the gastric acidity, pepsin concentration, and uropepsin excretion fell to the pre-ACTH level.

Since oral or parenteral daily administration of 200 to 250 mg. cortisone leads to a similar increase in uropepsin excretion, they believe that the effect of ACTH upon gastric secretion is mediated through the adrenal cortex rather than by direct action upon the stomach. It is well established that in response to emotional or systemic stress the cells of the anterior hypothalamus secrete a humoral substance which stimulates the pituitary gland to release ACTH. From this the Boston clinicians picture their third method of gastric control as a hypothalamus-pituitary-adrenal-stomach hormonal pathway of major clinical interest.

W. H. MANWARING, M.D.
Palo Alto, Calif.

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NOTICES AND REPORTS

Executive Committee Minutes

Tentative Draft: Minutes of the 230th Meeting of the Executive Committee of the California Medical Association, San Francisco, March 26, 1952.

The meeting was called to order by Chairman Lum in Room 212 of the St. Francis Hotel, San Francisco, at 4:00 p.m., Wednesday, March 26, 1952.

Roll Call:

Present were President MacLean, President-elect Alesen, Council Chairman Shipman, Speaker Charnock and Auditing Committee Chairman Lum, Editor Wilbur and Secretary-Treasurer Daniels. No absences. Present by invitation were Dr. D. H. Murray, legislative chairman; Executive Secretary Hunton, Assistant Executive Secretary Thomas, Public Relations Director Clancy and Mr. Ben H. Read, executive secretary of the Public Health League of California. A quorum present and acting.

1. *Membership:*

(a) On motion duly made and seconded, it was voted to reinstate four members whose 1951 dues had been received since the last Council meeting.

(b) On motion duly made and seconded in each instance, it was voted to elect nine applicants to Associate Membership. These were: Elizabeth Jolly, Luigi Luzzatti, S. H. Schonberger, James K. Smith, and Helen Wolfenden, Alameda-Contra Costa; Roy D. Smith and D. V. Wiebe, Fresno County; Paul Beddoe, Los Angeles County; Charles H. Ludwig, Sonoma County.

(c) On motion duly made and seconded in each instance, 18 applicants were voted Retired Membership. These were: R. T. Sutherland, Alameda-Contra Costa; Sidney R. Burnap, Cecil C. Cole, Marie Anna Conradi, R. E. Flesher, Horace H. McCoy, Rea Proctor McGee, Albert H. Moore, Milton M. Portis, George D. Stilson, A. W. Teel, Raymond C. Thompson, and Harry D. Van Fleet, Los Angeles County; Charles M. Fox, San Diego County; Edwin I. Bartlett, LeRoy H. Briggs, Leo Eloesser, and Robert S. Irvine, San Francisco County.

(d) On motion duly made and seconded in each instance, 25 applicants were voted a reduction of dues for postgraduate study or because of protracted illness.

(e) On motion duly made and seconded, it was voted to recommend to the Council that an amendment to Chapter II, Section 4(a) of the By-Laws be proposed to the House of Delegates, to provide that applicants for Retired Membership be considered eligible for such election if they had paid their dues for the current or the preceding calendar year.

2. *Committee on Rural Health:*

A report by Dr. Henry A. Randel on behalf of the Committee on Rural Health was discussed and it was regularly moved, seconded and voted that the Association office request each county society to appoint a committee on rural health to cooperate with the statewide committee.

3. *Committee on Postgraduate Activities:*

Discussion was held on the advisability of inviting technical exhibitors to display their products at postgraduate assemblies arranged by the Committee on Postgraduate Activities. It was pointed out that such exhibits have been sponsored in some areas by the Woman's Auxiliary or the county society, rather than by the Association. On motion duly made and seconded, it was voted that all technical exhibits at any meeting of the Association be screened by the C.M.A. Committee on Advertising and that funds secured from exhibits at meetings other than the Annual Session be retained by the sponsoring group.

On motion duly made and seconded, it was voted that the policy of inviting out-of-state speakers to the Postgraduate Assemblies be approved. It was suggested that schedules should be so arranged that one speaker could cover two or more meetings and that the regional institutes be increased to ten annually.

On motion duly made and seconded, it was voted to recommend to the Committee on Postgraduate Activities that its office be operated in conjunction with the proposed office of the San Joaquin County Medical Society.

4. *Committee on Hospitals, Dispensaries and Clinics:*

A report from the Committee on Hospitals, Dispensaries and Clinics, relative to California mineral

springs, was read and discussed. On motion duly made and seconded it was voted to thank the committee for its work but to table any action toward considering such mineral springs because of the apparent lack of medical properties claimed for such spas.

5. *Blood Bank Commission:*

On motion duly made and seconded, it was voted to appoint Dr. Leonard Taylor of San Bernardino as a member of the Blood Bank Commission, in compliance with a request by Dr. John R. Upton, chairman of the commission.

6. *State Department of Public Health:*

Dr. L. A. Alesen reported on a meeting held March 19 with representatives of the State Department of Public Health, at which time discussion was held on the present clinic licensing law. It was reported that the department feels that the present law may not be needed or that it might better be administered by some other state department. A further report is to be made to the Council on this subject.

7. *World Medical Association:*

A request for a renewal of a $1,000 annual subscription to the World Medical Association was considered and the executive secretary was requested to secure a report on the accomplishments and the financing of the organization. It was regularly moved, seconded and voted that, upon receipt of such report, it be recommended to the Council that the appropriation be made.

8. *American College of Physicians:*

On motion duly made and seconded, it was voted to invite the American College of Physicians, in behalf of the Association, to hold its 1955 or 1956 annual meeting in San Francisco.

9. *Conference on School Health:*

An invitation to attend an informal discussion in Los Angeles on April 9, 1952, between representatives of the State Department of Education and the Bureau of Health Education of the American Medical Association was discussed and it was agreed that Dr. Charnock would attend and report back to the Council at its next meeting.

10. *Alternate Delegate to A.M.A.:*

Report was made on the fact that Dr. A. E. Moore, elected in 1951 as an Alternate Delegate to the A.M.A., did not qualify under the A.M.A. requirement of two years of Fellowship immediately preceding such election. It was pointed out that the A.M.A. is now considering an amendment to its Constitution and By-Laws which would eliminate Fellowship and that if that is adopted, Dr. Moore would be eligible to serve. It was agreed to place this matter before the Council at its next meeting.

11. *California Physicians' Service:*

The subject of the bills submitted to C.P.S. for services not rendered was fully discussed. It was pointed out that a committee of the Association (C.P.S. Study Committee) has been investigating this matter and other phases of C.P.S.'s operations for several months. It was moved, seconded and carried that this Association's Committee on C.P.S. be directed vigorously to continue its investigation of the facts relating to false bills to C.P.S., and when it has completed its analysis of the facts that its conclusions and recommendations be incorporated in its report to the Association.

It was the further sense of the Executive Committee that the membership of the Association be made aware of the fact that the California Medical Association, through its C.P.S. Study Committee, has been and is working on the problem and will not discontinue its efforts until the conditions of which complaint has been made have been eradicated and their recurrence made impossible.

12. *California Medicine:*

Dr. Wilbur reported on a request he had received for assistance in securing advertising for county society bulletins and this was referred to the executive secretary.

On motion duly made and seconded, at the request of Dr. Wilbur, it was voted to appoint a representative of the general practitioners to membership on the Editorial Board.

13. *California Farm Bureau Federation:*

Dr. MacLean reported on a meeting held with officers of the California Farm Bureau Federation, at which a request was received for assistance in handling matters relating to the treatment of industrial injury cases. A specific outline of the problem and the assistance requested is to be filed for presentation to the Council.

14. *Public Relations:*

Dr. Charnock requested the assistance of representatives of the Department of Public Relations in working with local chapters of the Student A.M.A. and it was agreed that such assistance be granted.

15. *District Hospitals:*

Dr. MacLean reported on a meeting held with representatives of the Marin Hospital District, at which the C.M.A. was requested to make its position clear with regard to district hospitals now operating. The C.M.A. was also asked to send a representative to a coming meeting of the Association of District Hospital Directors. On motion duly made and seconded, it was voted to refer this matter to Dr. Thompson's subcommittee of the Committee on Public Health and Public Agencies for study and report to the Council.

Adjournment:

There being no further business to come before it, the meeting was adjourned at 7:30 p.m.

DONALD D. LUM, M.D., *Chairman*
ALBERT C. DANIELS, M.D., *Secretary*

In Memoriam

ANDERSON, GEORGE B. Died in Vallejo, February 18, 1952, aged 48. Graduate of Northwestern University Medical School, Chicago, 1939. Licensed in California in 1943. Dr. Anderson was a member of the Alameda-Contra Costa Medical Association, the California Medical Association, and the American Medical Association.

✤

BICE, CLYDE W. Died in Oakland, February 27, 1952, aged 75, of arteriosclerotic heart disease. Graduate of the University of Illinois College of Medicine, Chicago, 1902. Licensed in California in 1902. Dr. Bice was a member of the Alameda-Contra Costa Medical Association, the California Medical Association, and a Fellow of the American Medical Association.

✤

CONDIT, JOHN C. Died in Santa Rosa, March 16, 1952, aged 79, of coronary thrombosis. Graduate of the Cooper Medical College, San Francisco, 1904. Licensed in California in 1904. Dr. Condit was a retired member of the Alameda-Contra Costa Medical Association, the California Medical Association, and an Associate Fellow of the American Medical Association.

✤

DARIUS, DEAN J. Died in San Carlos, March 8, 1952, aged 44, of coronary artery disease. Graduate of Creighton University School of Medicine, Omaha, Neb., 1933. Licensed in California in 1933. Dr. Darius was a member of the San Mateo County Medical Society, the California Medical Association, and a Fellow of the American Medical Association.

✤

DAVIS, HENRY C. Died in Boyes Springs, February 28, 1952, aged 63. Graduate of the University of Toronto Faculty of Medicine, Ontario, 1911. Licensed in California in 1923. Dr. Davis was a member of the San Francisco Medical Society, the California Medical Association, and a Fellow of the American Medical Association.

✤

EDLER, WILLIAM A. Died in Pasadena, October 5, 1951, aged 69, of coronary occlusion. Graduate of Washington University School of Medicine, St. Louis, Mo., 1911. Licensed in California in 1924. Dr. Edler was a retired member of the Los Angeles County Medical Association, the California Medical Association, and an Associate Fellow of the American Medical Association.

GUGGENHEIM, LOUIS K. Died March 13, 1952, aged 68, after an extended illness. Graduate of Washington University School of Medicine, St. Louis, Mo., 1905. Licensed in California in 1930. Dr. Guggenheim was a retired member of the Los Angeles County Medical Association, the California Medical Association, and a Fellow of the American Medical Association.

✤

KELLY, EDWARD H. Died in Pasadena, February 21, 1952, aged 63. Graduate of the University of Michigan Medical School, Ann Arbor, 1911. Licensed in California in 1919. Dr. Kelly was a member of the Los Angeles County Medical Association, the California Medical Association, and the American Medical Association.

✤

LEVINE, EUGENE B. Died in Los Angeles, February 26, 1952, aged 38. Graduate of the Louisiana State University School of Medicine, New Orleans, 1939. Licensed in California in 1939. Dr. Levine was a member of the Los Angeles County Medical Association, the California Medical Association, and a Fellow of the American Medical Association.

✤

PRESNELL, JAMES F. Died in Los Angeles, March 1, 1952, aged 85, of coronary artery disease. Graduate of the State University of Iowa College of Medicine, Iowa City, 1889. Licensed in California in 1931. Dr. Presnell was a retired member of the Los Angeles County Medical Association, and the California Medical Association, and a Fellow of the American Medical Association.

✤

SHUMATE, THOMAS E. Died in San Francisco, February 27, 1952, aged 80, of coronary artery disease. Graduate of the Cooper Medical College, San Francisco, 1894. Licensed in California in 1894. Dr. Shumate was a member of the San Francisco Medical Society, the California Medical Association, and the American Medical Association.

✤

WRIGHT, LAVERNE. Died in San Francisco, March 2, 1952, aged 74. Graduate of the University of Michigan Medical School, Ann Arbor, 1901. Licensed in California in 1905. Dr. Wright was a retired member of the San Francisco Medical Society, the California Medical Association, and a Fellow of the American Medical Association.

Questions and Answers about C. P. S.

Question: When did the removal of the one-year limitation on surgical services under C.P.S. surgical contracts become effective?

Answer: April 15, 1952.

Question: What significance does the removal of the one-year limitation on surgical care have, for both the physician and the member?

Answer: The removal of this limitation became effective April 15, 1952. Previous to this change a C.P.S. member was allowed listed surgical benefits for one year (from the date of operation) for each condition. In effect, the new ruling provides continual surgical care, if necessary to correct a lesion, for each condition as long as the member retains C.P.S. membership. Thus, complications or sequelae of a condition, occurring more than one year after the original date of operation, will be considered as a C.P.S. liability. The severe case which requires more than one year's care will be covered until care is no longer necessary—not terminated at the end of one year.

Questions of whether maximum care has already been provided or whether the new development is related to prior procedure need no longer concern either the physician or the member. If operation is necessary, listed benefits of C.P.S. surgical contracts will apply, without regard either to the previous one-year limitation or surgical services for the condition which the member may already have received.

Question: In the past, the one-year limitation on surgical services has meant that C.P.S. did not pay for bilateral surgical procedures when more than one year had elapsed since the first of the bilateral procedures was performed and if the basic disease was the same in each case. Will removal of the one-year limitation mean that C.P.S. henceforth will cover bilateral operation?

Answer: Yes. Removal of the one-year limitation means that C.P.S. surgical contracts will cover bilateral surgical procedures, whenever they are performed for such conditions as cataracts, hernia and fibrocystic breast conditions.

Question: Are the time limitations on C.P.S. medical and hospital contracts affected by the removal of the one-year limitation in the surgical contract?

Answer: No. The change in the C.P.S. surgical contract has no effect whatever on medical or hospital contracts.

Question: Please clarify the recent change in the medical-while-hospitalized contract which makes benefits available from the physician's first visit to the hospital, rather than the third visit.

Answer: This change (effective April 15, 1952) will mean: When patients holding medical-while-hospitalized coverage are hospitalized, it will no longer be necessary for the physician to bill the patient for the first and second visits, regardless of the condition requiring hospitalization.

Question: Does the change in the medical-while-hospitalized contract alter the two-visit-deductible medical contract?

Answer: The two-visit-deductible medical contract is not affected. Members holding two-visit-deductible medical coverage will still be responsible for the first two visits.

Question: When and where will physicians be able to see the motion picture which C.P.S. has produced showing internal functions of C.P.S.?

Answer: The film (called "The Doctors' Plan") is completed and is ready for showing to physicians at their county society meetings and hospital staff meetings. C.P.S. will contact these groups throughout the state in order to arrange scheduling of the presentation; or county societies and hospital staffs may initiate the scheduling arrangements by advising C.P.S. of dates which are most suitable. Two prints of the film have been made so it can be shown simultaneously in Northern and Southern California.

Question: I have not requested authority for treatment of a particular veteran, but I wish to write a prescription for his use. How can this be done under the home town care program?

Answer: It is necessary that the physician have a current authorization for treatment of the specific service-connected condition for which he wishes to prescribe. Requests for authorizations of this type may be made by telephone, collect, to the Veterans Administration Authorization Officer in San Francisco, Los Angeles or San Diego, explaining that authorization is desired so that a prescription may be written.

Question: In treating veteran patients, if an appointment for laboratory or x-ray services cannot be made during the authorized period, how do I again make request for these services?

Answer: The physician should request a re-authorization of the laboratory or x-ray procedures, indicating that the services previously authorized could not be performed during the period in which they were authorized.

Question: Can a veteran patient be billed for balance charges if his earnings are over the C.P.S. income ceiling?

Answer: No. The income ceiling is only for members enrolled under the C.P.S. commercial program. Fees paid by the Veterans Administration for authorized services to veteran patients under the Home Town Care Program are payments in full.

NEWS and NOTES

NATIONAL • STATE • COUNTY

ALAMEDA

Dr. Paul C. Samson of Oakland was elected president of the **California Tuberculosis and Health Association** at the recent annual meeting of the organization in San Francisco. He succeeds Dr. Emil Bogen of Olive View. Dr. Rufus Scheiders of San Diego was elected vice-president.

LOS ANGELES

Richard W. Lippman, M.D., Research Associate at the Institute for Medical Research, Cedars of Lebanon Hospital, has been elected chairman of the Southern California Section of the **Society for Experimental Biology and Medicine** for the academic year 1952-1953.

* * *

Dr. Joseph L. Robinson has been elected president and Dr. David T. Proctor vice-president of the **Los Angeles County Tuberculosis and Health Association.** Dr. Robinson and Drs. Emil Bogen, Reginald Smart, Leo Tepper and John Urabec were reelected to the board of directors of the association.

* * *

Dr. Abraham Schwartz and Dr. J. H. McClellan recently were announced as joint winners of this year's award by the California Trudeau Society. They were given the $150 prize for a paper reporting upon electroshock therapy of tuberculous patients at the Brentwood Veterans Administration Hospital.

SAN FRANCISCO

Physicians are invited to attend the semi-annual session of the **Northern California Rheumatism Association** to be held Saturday afternoon, May 24, in the auditorium of the Veterans Hospital, Fort Miley, 42nd Avenue and Clement Street, San Francisco. The program follows:

1:00 p.m.—Clinical Laboratory Aids in Rheumatic Diseases—Gerson R. Biskind, M.D.

1:20—Possible Role of Pleuropneumonia-like Organisms in Diseases of Childhood—Herve J. Carlson, M.D.

1:40—Long Range Treatment with ACTH and Cortisone—Ephraim P. Engleman, M.D.

2:00—Observations on Distribution and Fate of Gold in the Animal Body—John J. Bertrand, M.D.

2:20—The Nature of Psoriasis—Eugene M. Farber, M.D.

2:40—President's Address: The Doctor's Responsibility in the Care of the Arthritic Patient—John J. Loutsenheiser, M.D.

2:50—Recent Basic Studies concerning ACTH and Metabolism—Laurance W. Kinsell, M.D.

3:10—Evaluation of Surgical Procedures in Rheumatic Diseases—Francis J. Cox, M.D.

3:30—Pain from Skeletal Lesion—Verne Thomson Inman, M.D.

3:50—Certain Vascular Aspects of Arthritic Disease—Norman E. Freeman, M.D.

4:10—Intra-articular Use of Compound F—Roland Davison, M.D.

TULARE

The Tulare County Medical Society announced its **second annual postgraduate program,** under the auspices of the California Medical Association, Committee on Postgraduate Activities, to be held Sunday, May 18, at the Hotel Johnson, Visalia. The program will begin at 9 a.m. and continue until 5 p.m. The speakers and their subjects:

Daniel G. Morton, M.D., professor and chairman of the department of obstetrics and gynecology, University of California at Los Angeles—"Indications for Gynecological Surgery" and "Office Gynecological Procedures."

William L. Hewitt, M.D., clinical assistant professor of medicine, U.C.L.A.—"Recent Advances in the Use of Antibiotic Agents," and "Complications Following the Use of Antibiotic Drugs."

Paul E. McMasters, M.D., clinical professor of surgery (orthopedics), U.C.L.A.—"Treatment of Common Fractures," and "Treatment of the Complications of Fractures."

A registration fee of $5.00 will be charged to help defray the expense of the program.

GENERAL

The 30th annual scientific and clinical session of the **American Congress of Physical Medicine** will be held on August 25, 26, 27, 28 and 29, 1952, inclusive, at the Roosevelt Hotel, New York, N. Y. Scientific and clinical sessions will be given on the days of August 25, 26, 27, 28 and 29. All sessions will be open to members of the medical profession in good standing with the American Medical Association. In addition to the scientific sessions, annual instruction seminars will be held. These lectures will be open to physicians, as well as to physical therapists who are registered with the American Registry of Physical Therapists or the American Occupational Therapy Association.

Full information may be obtained by writing to the American Congress of Physical Medicine, 30 North Michigan Avenue, Chicago 2, Illinois.

* * *

The American Heart Association has issued a revision of the chart, "Classification of Patients with Diseases of the Heart," which has gained wide acceptance as a guide to functional capacity and therapeutic classification of patients with heart disease. The revised version of the chart is to be incorporated in the new edition of the Association's book, "Nomenclature and Criteria for Diagnosis of the Heart," schedule for publication within the next few months. Prepared by the Criteria Committee of the New York Heart Association, the chart has proved useful in helping physicians determine the amount of activity a patient can tolerate.

POSTGRADUATE EDUCATION NOTICES

UNIVERSITY OF CALIFORNIA SCHOOL OF MEDICINE

Psychiatry and Neurology—The Langley Porter Clinic.

Date: August 25 through October 31, 1952, ten weeks, full time.

Fee: Fee for the course is $200.

The course is particularly designed to prepare psychiatrists and neurologists for taking the examinations of the American Board of Psychiatry and Neurology.

Conference on General Surgery—Toland Hall, University of California Hospital.

Date: September 8 through 12, 1952.

Fee: $75.00.

This course is offered for the purpose of stressing the newer concepts, methods of diagnosis, treatment, and techniques in surgery. Instruction will consist of didactic periods, panel discussions and actual *Operative Demonstrations*. Class limited to 50.

Contact: Stacy R. Mettier, M.D., Head Postgraduate Instruction, Medical Extension, University of California Medical Center, San Francisco 22.

STANFORD UNIVERSITY SCHOOL OF MEDICINE

Postgraduate Courses for Practicing Physicians

Date: September 15-19, 1952.

All-Day Courses: Internal Medicine and Therapeutics; General Surgery and Surgical Anatomy; Cardiology.

Morning Courses: General Medicine; Fractures and Trauma to Soft Tissues; Obstetrics and Gynecology; Dermatology.

Afternoon Courses: Proctology; Pediatrics; Psychiatry; Arthritis and Rheumatic Diseases.

Fee: $75.00 for the combination of morning and afternoon course, or the all-day course (not covered by veterans' educational benefits).

Registration limited: Each physician may register for one morning and one afternoon course or one all-day course.

Contact: Dean, Stanford University School of Medicine, 2398 Sacramento Street, San Francisco 15, California.

UNIVERSITY OF CALIFORNIA AT LOS ANGELES SCHOOL OF MEDICINE

Symposium on Hypnosis

Date: June 25, 26, 27, 1952.

Fee: $50.00. Reduced fee $25 for students now working toward graduate degrees in psychology or psychiatry.

Chairman: Roy M. Dorcus, Ph.D.

Guest Lecturers: Milton H. Erickson, formerly Director Psychiatric Research and Training, Wayne County General Hospital; Associate Professor of Psychiatry, Wayne University School of Medicine, Detroit, Michigan; now, practicing Psychiatrist, Phoenix, Arizona.
Frank A. Pattie, Ph.D., Professor Psychology, University of Kentucky.
Frank Kirkner, Ph.D., Chief, Clinical Psychology, Veterans Administration Hospital, Long Beach.

Discussants: Lester F. Beck, Ph.D., James S. L. Jacobs, M.D., Seymour Pollack, M.D., James H. Rankin, M.D., Charles O. Sturdevant, M.D., Eugene Ziskin, M.D.

Contact: Thomas H. Sternberg, M.D., Head of Postgraduate Instruction, Medical Extension University of California, Los Angeles 24, California.

UNIVERSITY OF SOUTHERN CALIFORNIA SCHOOL OF MEDICINE

Internal Medicine—Course 830—Los Angeles County Hospital.

Date: September 15, 1952 through June 1, 1953, full time.

Fee: Fee for the course is $750. Mail check to University of Southern California, School of Medicine, Department of Internal Medicine, Box 158, 1200 North State Street, Los Angeles 33. Course limited to eight students; applications will be accepted until July 15, 1952.

Intensive Review of Internal Medicine

Date: September 15 through September 26, 1952—8:30 a.m. to 12:30 p.m., Monday through Friday.

Fee: $50.00; applications accepted until August 1, 1952.

This course is offered for students preparing to take examination for the American Board of Internal Medicine.

Contact: Donald Petit, M.D., Assistant Professor of Medicine.

INFORMATION

Seventh National Conference on Rural Health

Leaders in health throughout the United States met in Denver, February 27 to March 1, for the seventh National Conference on Rural Health sponsored by the Council of the same name of the American Medical Association. Representatives of farm groups (the American Farm Bureau, the National Grange, the Agricultural Extension Service) and of labor groups, and health educators met with medical leaders in rural areas to discuss formally and informally problems of mutual concern.

An entire day preceding the formal conference was taken up with the discussion of "The Physician as a Citizen." Many ideas, mostly constructive but some critical, were expressed. It appeared, however, that the discussion was mutually profitable. The valuable contribution of the health educator was demonstrated by the description of activities in several rural areas, particularly North Carolina, where the health educator, working with the physician, has done much to improve the general health status. Medical service has likewise been improved as the result of these activities.

A great deal of stress was laid upon the importance of the development of State Rural Health Councils. Several states have advanced to a considerable degree in promoting better health and medical service to areas, purely as the result of the mutual contributions of interested groups. In many areas physicians working with the public health department and the agricultural extension service, have succeeded in bringing order out of chaos for the benefit of all concerned.

It is noteworthy that in all the discussions the consensus of opinion was that progress could and should be made through individual effort starting at the grass roots. Collectivistic effort in the form of governmental intervention and control was universally frowned upon. Farm representatives in particular were vocal in their disavowal of governmental assistance. It was the consensus that no one organization could be held responsible for the success or failure of a program and that only through the combined efforts of all giving personally of their time and money could success be achieved.

The trials and tribulations facing a young general practitioner entering a small rural community were colorfully described by Dr. Kenneth Kaisch of Philip, South Dakota. He described the hurdles to be encountered by a doctor of medicine in a sparsely settled rural community and how success and satisfaction could be gained by the doctor entering into the spirit of the community as a total citizen as well as the dispenser of medical service.

The conference was highlighted and honored by the presence of, as well as the addresses given by, two outstanding United States citizens. Dr. John Cline, president of the American Medical Association, addressed the entire conference, as did Mr. Allan Kline, president of the American Farm Bureau. Their messages were enthusiastically received.

Homage was paid to Dr. Albert C. Yoder in the closing hours of the session. Doctor Yoder was designated the general practitioner of the year during the last meeting of the House of Delegates of the American Medical Association. He is 84 years of age and still practicing medicine in Indiana. It appeared that everyone caught the spirit of this fine gentleman's contribution.

California's representatives included Frank Doughty, M.D., who is a member of the A.M.A.'s Council on Rural Health; Andrew Bone, Director of Direct Services Department of the California Farm Bureau; Carroll Andrews, M.D., of Sonoma, a member of the California Medical Association's Committee on Rural Health; John C. Dement, M.D., San Francisco; Dwight Murray, M.D., Napa, and Henry A. Randel, M.D., Fresno.

HENRY A. RANDEL, M.D., *Chairman,*
C.M.A. Committee on Rural Health.

BOOK REVIEWS

PLASTIC SURGERY OF THE NOSE—Including Reconstruction of War Injuries and of Deformities from Neoplastic, Traumatic, Radiation, Congenital and Other Causes—James Barrett Brown, M.D., Professor of Clinical Surgery, Washington University School of Medicine, St. Louis; Chief Consultant in Plastic Surgery, U. S. Veterans Administration; and Frank McDowell, M.D., Assistant Professor of Clinical Surgery, Washington University School of Medicine, St. Louis. With 379 Illustrations including 48 in color. The C. V. Mosby Company, St. Louis, 1951. 427 pages. $15.

A worthwhile practical clinical book which fulfills the author's hopes that it contain features of interest to those already engaged in rhinoplastic surgery, as well as serve as a useful guide to surgeons, both civilian and military, just beginning this work.

The short introduction and historical note show great restraint. The chapter dealing with the preoperative examination and evaluation of patients for plastic surgery of the nose is concise; yet the subject matter is so well selected and presented that it should be read by not only those who are actively engaged in doing rhinoplastic surgery but by all who have or may have reason to recommend or discuss the problems with this type of patient.

The volume does not present detailed fundamental anatomy of the area. The chapter on preliminary preparations and anaesthesia is so brief and lacking in detail as to be of little real value. The deletion of this material does permit the volume to be of reasonable size and weight and is justifiable on the basis that this knowledge is or should be obtained from the numerous available recognized sources, and experience as part of the surgeon's basic training.

The numerous illustrations showing what can be accomplished by means of rhinoplastic surgery are excellent, both as to selection and reproduction. However, even those for whom the book is intended would appreciate more detail as to how those results were obtained and more information as to how to recognize the many pitfalls which, if not avoided, negate the opportunity to duplicate these most satisfactory results.

* * *

1951 YEAR BOOK OF OBSTETRICS AND GYNECOLOGY (August 1950-June 1951)—Edited by J. P. Greenhill, B.S., M.D., F.A.C.S., Professor of Gynecology, Cook County Graduate School of Medicine. The Year Book Publishers, Inc., Chicago, 1951.

The worthwhile literature in obstetrics and gynecology published from August 1950 to June 1951 is reviewed by Greenhill in the Year Book for 1951. The editorial comments are even more interesting than in previous editions.

While there have been no outstanding advances in the specialty as reported for last year, the chapter on the newborn is outstanding. The obstetrician, pediatrician and pathologist are attacking the problem of prematurity. The increased interest in neonatal pathology with special emphasis on the hyaline membrane and erythroblastosis will undoubtedly effect a reduction in fetal mortality.

The early diagnosis of, and surgery versus radiation in carcinoma of the cervix continues to be debated and the editorial notes are particularly effective in studying this subject.

The Year Book quiz received with the book is an excellent evaluation of one's familiarity with the current literature. The Year Book continues to be an excellent survey of the obstetrical and gynecological writings, and in such capable hands as the editor, Dr. J. P. Greenhill, it will be a handy reference for the busy practitioner and specialist as well.

THE CHILD IN HEALTH AND DISEASE — Second Edition—A Textbook for Students and Practitioners of Medicine—Clifford G. Grulee, M.D., Rush Professor of Pediatrics, University of Illinois; and R. Cannon Eley, M.D., Assistant Clinical Professor of Pediatrics, Harvard University Medical School. The Williams and Wilkins Company, Baltimore, 1952. 1255 pages. $15.00.

The appearance of a second edition of Grulee and Eley's text only four years after the first bespeaks its popularity and practical usefulness. The list of contributors is impressive in numbers (87) and individual competence. New chapters have been added on adoption, medical supervision of summer camps, cardiovascular surgery (by Potts of Chicago) and viral hepatitis, and the sections on erythroblastosis fetalis and pancreatic fibrosis have been expanded by the addition of much new material into separate chapters. The volume contains a good deal of material not so well or so completely covered, and some that is not found at all in the other American texts. It should be a useful addition to the libraries of pediatricians and general practitioners and valuable to medical students for reference purposes.

There is an excellent index covering 47 pages. Bibliographic references follow the individual sections. There are many illustrations, some in color, most of which are of good quality.

* * *

THE 1951 YEAR BOOK OF DRUG THERAPY—Edited by Harry Beckman, M.D., Director, Departments of Pharmacology, Marquette University Schools of Medicine and Dentistry. The Year Book Publishers, Inc., 200 East Illinois Street, Chicago 11, 1951. 502 pages. $5.00.

The Yearbook of Drug Therapy may be recommended once again. It is an excellent means of getting an unbiased evaluation of the work of the past year in the pharmacological field.

Along with its obvious and repeated virtues it has a major defect which should be mentioned: One accepts an arbitrary chronological delimitation for the abstracts in a year book. This means that certain relevant articles must necessarily be omitted because they fall outside the period covered. This is regrettable—but understandable. However, when such articles fall well within the prescribed time limit, there is no excuse for leaving them out. To illustrate: On page 269 the use of aureomycin in hepatic insufficiency is given a big boost by the abstract of Goldbloom and Steigmann's report in *Gastroenterology* for May 1951. But this is the only abstract on this subject despite the fact that other articles have appeared in the literature (notably the most extensive researches of Lepper and his colleagues in the *Archives of Internal Medicine* for July 1951) well within the time limits set for this volume.

* * *

TEXTBOOK ON REFRACTION—Edwin Forbes Tait, M.D., Ph.D., Associate Professor of Ophthalmology, Temple University School of Medicine. Illustrated. W. B. Saunders Company, Philadelphia, 1951. 418 pages. $8.00.

Doctor Tait in his preface states his book is primarily for a student group studying ophthalmology.

Books on refraction compared to books on other phases of ophthalmology are rare. Since it is obvious that refraction is the major part of an ophthalmologist's work more study should be made of refraction and its many ramifications.

This book of 28 chapters and 394 pages covers the subject concisely. It brings us up to date in refraction. It furthermore has a brief discussion of fusional defects and the use of orthoptics.

THE NEW WAY TO BETTER HEARING—Through Hearing Reeducation — Victor L. Browd, M.D., Adjunct Professor of Otolaryngology, New York Polyclinic School and Hospital. Crown Publishers, 419 Fourth Avenue, New York, 1951. 226 pages. $3.00.

There are several things about this book which make an unprejudiced review difficult: (1) an item on the jacket states, "For the first time, in *The New Way to Better Hearing*, Dr. Browd makes available to the public at large, as well as to his colleagues, his amazingly successful method of hearing improvement"; (2) a letter from the publisher states, "... every patient who has submitted to Dr. Browd's treatment has proven it to be successful"; (3) the publisher's preface states, "Although, as Dr. Browd points out, professional attention is advisable, particularly in the beginning, it is not indispensable in most cases and the patient, with the aid of this book and a friend or relative, can achieve better hearing within a comparatively short time"; (4) the case reports have been written in a form to suggest testimonials. All this, together with the quality of the paper, which is like that used in the pulp magazines of the "popular" variety, leaves little doubt that the presentation had been planned for "mass appeal."

This book, with such a title, should qualify as a best seller. What hard-of-hearing person wouldn't risk three dollars for the newest in help for his affliction?

Is hearing reeducation as described in this book new? The basic principle is concerned with the use of the remaining hearing power the patient still possesses and with reeducating the individual to interpret meaningless sounds into meaningful sounds. This principle is not new; it has been advocated by many others, notably M. A. Goldstein, who published in 1939, "The Acoustic Method for Training of the Deaf and Hard-of-Hearing Child." Browd's claim to distinction is that he advocates hearing reeducation without a hearing aid and "because it (his system) is an improvement over other systems, and its most important and effective features are original and not to be found in other programs for improving the hearing, the advances are so radical, the advantages and benefits so great that it outmodes and replaces current programs wherever it is used. The greatest single advance is freeing of unused hearing power so that no hard-of-hearing person is excluded from the possibility of better hearing." Browd, of course, is entitled to his own opinion.

There are sentences in the book which state that, in certain instances, a hearing aid is necessary for hearing reeducation in some individuals, but the over-all impression is that these patients are in the minority and that most can be reeducated without the use of a hearing aid. In a previous publication (*Archives of Otolaryngology*, May 1949), however, Browd states, "As a rule, those with more than a 40-decibel average loss between the frequencies of 128 and 8192 cycles per second in the better ear require both hearing aid and hearing reeducation, but some patients with a loss as great as 50 decibels can be brought to a satisfactory level without a hearing aid."

The problem of tinnitus, according to this book, is easily solved. It is said that the cause of the patient's head or ear noises is the impaired hearing itself and that an improvement in hearing will abolish all these noises.

Disregarding its embellishments and extravagant claims, this book has much to be said in its favor. It outlines in detail, step by step, the management of an individual, in a variety of situations, in the process of hearing reeducation. There are several chapters of appendices which include speech-sound interpretation tests, a hearing disability questionnaire, sample demonstrations, hearing reeducation schedules, and speech-sound lists for foreign patients.

It is regrettable that this book has been written for mass appeal. It could have been, with dignity, a contribution.

HORMONES AND BODY WATER — Robert Gaunt, Ph.D., and James H. Birnie, Ph.D., Department of Zoology, Syracuse University, Charles C. Thomas, Publisher, Springfield, Illinois, 1951. 57 pages. $2.25.

In this small monograph are reviewed very briefly the actions of various hormones in regulating the water content of the body, and related problems are also mentioned. The authors, experts in this field, have previously published much of the material in detail elsewhere.

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BODY, MIND AND SUGAR—E. M. Abrahamson, M.D., and A. W. Pezet, Henry Holt and Company, New York, 1951. 206 pages. $2.95.

Dr. Abrahamson diagnosed hypoglycemia in Mr. Pezet and then repeated the performance by making the same diagnosis on Mrs. Pezet. Mr. Pezet, a writer by profession, felt this unique situation demanded a book, and so *Body, Mind and Sugar* was written.

If the authors had confined their observations to the hypoglycemic Pezets and a limited number of similarly afflicted persons this reviewer would be more tolerant of their efforts. But when they make the statement that 10,000,000 to 30,000,000 citizens of the United States have hypoglycemia and that the condition is the cause of heart arrhythmias, peptic ulcer, asthma, alcoholism, neuroses, and many other conditions, then one is justified in questioning the validity of their remarks. When in addition they make the statement that the bulk of the medical profession is not interested in the condition, then it seems only just that they actively defend their thesis.

Dr. Abrahamson's stand may be stated briefly as follows: Many people suffering from chronic fatigue, ulcer, asthma, etc., have what he considers an abnormal six hour glucose tolerance test. He defines abnormality by saying that the blood sugar following the ingestion of 100 grams glucose falls below 70 mg. per 100 cc. He also makes the statement that the normal non-fasting blood sugar is around 140 mg. per 100 cc. Now it is certain that most normal people run blood sugar considerably below 140 mg. per 100 cc., as we have all found repeatedly when doing postprandial blood sugar determinations. It is also extremely likely that many normal people will have blood sugar as low as 70 mg. per 100 cc. some time after the ingestion of 100 grams glucose. Unfortunately, the authors do not present any details as to the results on control cases. Furthermore, their conclusions do not agree with those of many workers in this field, particularly those interested in psychiatry.

In several places in the book the authors have been guilty of bad taste in implying that the medical profession has been disinterested in the subject because of its lack of popular appeal. They also bring up the old melodramatic story of the heroic intern saving the child's life by forcibly pushing aside the older, more experienced doctor. After all, plenty of us who are interested in hyperinsulinism cannot agree with the authors, and it seems unfair to damn doctors unduly in a book designed for the lay reader.

Finally, however, it must be admitted that their book does raise many interesting points regarding the effects of carbohydrate metabolism on the human being. This reviewer is sympathetic to the idea that eating meals high in carbohydrates, coffee-drinking, emotional strain, etc., do induce a state of fatigue. He is not willing to concede that the answer to the problem may be found merely by determining blood sugar levels. And to a practical physician, one question at once comes to mind: Why not merely try the effect of the high protein diet on the individual patient instead of doing six-hour glucose tolerance tests whose significance is at best doubtful?

CALLANDER'S SURGICAL ANATOMY—Barry J. Anson, M.A., Ph.D. (Med. Sc.), Professor of Anatomy, Northwestern University Medical School; and Walter G. Maddock, M.S., M.D., F.A.C.S., Elcock Professor of Surgery, Northwestern University Medical School. W. B. Saunders Company, Philadelphia, 1952. 1,074 pages, 929 illustrations. $14.00.

To those familiar with the first two editions of Callander's Anatomy little need be said regarding the value of this third edition. In the reviewer's opinion Callander's Anatomy is the leader in the field of surgical anatomy because it was written by a surgeon for surgeons and its approach to all regions of the body is the approach of the surgeon.

The publishers, W. B. Saunders Company, were very wise in their choice of the Anson-Maddock team to make the revision. Wherever illustrations from "The Atlas of Human Anatomy" could contribute to Callander's Surgical Anatomy they were used. Judgment in the use of these added illustrations and a number of quite new illustrations to go with the revised text have blended to make an excellent result in the third edition of Callander's Anatomy. The value of the work has been very much enhanced by the latest edition and in this reviewer's opinion the volume has become a "must" in the surgeon's library.

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CLINICAL HEMATOLOGY—Maxwell M. Wintrobe, M.D., Ph.D., Professor of Medicine and Director, Laboratory for the Study of Hereditary and Metabolic Disorders, University of Utah, College of Medicine, Salt Lake City. Third Edition, thoroughly revised. 220 illustrations and 17 plates, 13 in color. Lea & Febiger, Philadelphia, 1951. 1,048 pages. $12.50.

The many recent advances in hematology have necessitated a new edition of this book, and Dr. Wintrobe again has done an admirable job. Unlike some other books which are obsolete before they appear, the text and bibliography is complete to the time of publication.

The newer therapeutic agents are included; among them are folic acid, vitamin B_{12}, the nitrogen mustards, the folic acid antagonists—ACTH and cortisone. The section on immunity mechanisms in hemolytic anemia is somewhat brief. The discussion of blood coagulation is as complete as is possible at this time. Several new and excellent illustrations from other recent publications have been included.

Despite the increasing size of the book (now over 1,000 pages), it is still very readable. With the complete bibliography and careful indexing, it is an excellent reference source. This book continues to be the outstanding text in the field of hematology and one of the classic texts in the field of medicine.

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BIOLOGICAL ANTAGONISM—The Theory of Biological Relativity—Gustav J. Martin, Sc.D., Research Director, the National Drug Company, Philadelphia. The Blakiston Company, Philadelphia, 1951. 516 pages. $8.50.

This book covers very comprehensively the general phenomenon of the antagonism between various substances in biological systems, especially those instances of displacement reactions in which a substance interferes with a biologically important substance by reason of its structural similarity. The treatment is very clearly organized and is arranged in a logical manner that will facilitate the study of the subject by those who are not completely acquainted with the field; yet it is so complete that it will adequately serve as a source book for all of the important work done on this subject. There are 1900 references to all of the major papers and it brings the entire subject up to date in a most illuminating cross-section of our present knowledge.

The subject is introduced by a discussion of enzymatic inhibition, since this is basic to the whole theory, and then proceeds to pharmacological examples, including the drugs altering the function of the autonomic nervous system, the antihistamines, the depressants of the central nervous system and others. This naturally leads into a comprehensive discussion of the sulfonamides and their relationship to p-aminobenzoic acid and folic acid. Since many of our modern views have been obtained from investigations of these drugs, which were responsible for the rebirth of the principle of biological antagonism in 1940, it is particularly valuable to have this work set out in a complete and yet concise manner. There follow several chapters taking up antagonists to the various amino acids and this is climaxed by a most interesting section on the antagonisms between proteins, including immunological phenomena, antibodies to enzymes and hormones, and interference among viruses. This is especially welcome, since I know of no other place where these data have been accumulated to contribute to the general theory. The next seven chapters deal with metabolite analogues or antagonists to the various growth factors and vitamins involved in cell function from the most simple bacteria to the higher multicellular animals, giving a complete summary of all compounds investigated with their effects upon various cells and enzyme systems. Hormone antagonisms are then discussed, including plant hormones, sex hormones and thyroxine. A brief review is given of ion antagonisms in microorganisms and enzyme systems, including the phenomenon of chelation, and this is followed by a chapter devoted to miscellaneous antagonisms such as are involved in the porphyrins, the basic proteins, dyes, fatty acids and substances that interfere with the sulfhydryl groups of enzymes. A short chapter on bacterial adaptation and the development of drug resistance is included since it represents a mechanism by which the cell compensates for interference within its metabolic pattern. A final chapter gives the theory of biological relativity in general terms.

The clinical and therapeutic aspects have not been neglected; thus, for example, there are discussions of the therapy of leukemias and tumors with folic acid derivatives, the chemotherapy of various infections and the possibilities inherent in these methods of further progress in such fields as thyroid suppression. I do not hesitate to state that this is the most thorough and best organized work that we have on all aspects of this subject—it will perhaps remain such for some time—and I believe that it will not only be of great value to investigators but also to biologists and clinicians who realize more and more that such principles must underlie their basic understanding of vital processes and the factors modifying them.

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A COURSE IN PRACTICAL THERAPEUTICS—Second Edition—Martin Emil Rehfuss, M.D., F.A.C.P., Professor of Clinical Medicine and Sutherland M. Prevost Lecturer in Therapeutics, The Jefferson Medical College; and Alison Howe Price, A.B., M.D., Associate Professor of Medicine, The Jefferson Medical College. The Williams and Wilkins Company, Baltimore, 1951. 938 pages. $15.00.

The first edition of this textbook, published in 1948, was given an enthusiastic recommendation in CALIFORNIA MEDICINE (70:83, Jan. 1949). The second edition, brought out some three years later, contains new material which brings it up to date for current consultation. Again the volume merits hearty praise. There is no other in the field of medical therapeutics which is more practical or usable. It combines incisiveness along with remarkable inclusiveness—making it an excellent reference. And it details the most recent information on scientific treatment while retaining some of the time-tested remedies which date back to the 19th century, a profitable example of "the old along with the new."

It belongs on the shelf of the internist and the general practitioner—and will prove most useful to medical students.